LMI

AN APPRAISAL OF INSTITUTIONAL FORUMS FOR INTERNATIONAL ARMAMENTS COOPERATION

Briefing Book AR705B1

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EXECUTIVE SUMMARY

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- The U.S. Army participates in hundreds of bilateral and multilateral institutional forums dealing with aspects of international armaments cooperation.

- With few exceptions, such forums focus on information exchange and standardization, not on generating cooperative R&D agreements.

- U.S. Army efforts in recent years to foster cooperative R&D and production of defense materiel have produced only limited tangible results to that end.

EXECUTIVE SUMMARY

The U.S. Army participates in hundreds of institutional forums dealing with aspects of international armaments cooperation, including bilateral forums with Germany and France; forums under the Senior National Representatives (Army); the American-British-Canadian-Australian (ABCA) Armies Standardization Program and Quadripartite Working Groups (QWGs); other multilateral forums such as NATO Army Armaments Group panels and the Military Agency for Standardization and its Working Parties; and the international technology research and development (R&D) forums of the Defense Research Group and The Technical Cooperation Program.

With few exceptions such forums focus on information exchange and standardization of operational concepts, procedures, and materiel, not on generating cooperative R&D agreements. In some cases, for example, available ABCA forum records indicate that neither the work priorities nor the actual activities of the QWGs address cooperative R&D, even though it falls within their charters. In other cases, particularly in some of the NATO forums, it is evident that many projects in the past were started without serious commitments by participating countries to cooperative R&D.

Although the Army has taken many steps in recent years to foster cooperative R&D and production of defense materiel, the hundreds of institutional forums have produced only limited tangible results to that end. Virtually all of the dozen cooperative R&D agreements that are currently in effect for the Army were achieved through *ad hoc* forums (working groups chartered for the express purpose of negotiating and concluding a specific memorandum of understanding), not the institutional forums.

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AN APPRAISAL OF INSTITUTIONAL FORUMS FOR INTERNATIONAL ARMAMENTS COOPERATION

TASK AR705

OBJECTIVE: A FACTUAL APPRAISAL OF THE ACTIVITIES AND ACCOMPLISHMENTS OF INSTITUTIONAL FORUMS FOR INTERNATIONAL ARMAMENTS COOPERATION.

AN APPRAISAL OF INSTITUTIONAL FORUMS FOR INTERNATIONAL ARMAMENTS COOPERATION

This briefing presents the findings of LMI Task AR705 conducted for the Assistant Deputy for International Cooperative Programs of Headquarters, U.S. Army Materiel Command.

To accomplish the study objective stated here we picked a representative sample of forums, went through the available records, and summarized their activities and accomplishments. We also developed a way of evaluating the productivity or effectiveness of these cooperative forums, but pursuant to the client's guidance we did not formulate conclusions or recommendations. Rather, we let the facts speak for themselves.

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BRIEFING ROADMAP

- Army International Activities
- Overview of Forums and Survey Sample
- Activities and Accomplishments by Forum Category:
  - Bilateral
  - Four Power
  - ABCA
  - NATO
  - TTCP
- Appraisal of Productivity of Forums
  - Measures
  - Taxonomy
- Issues and Observations

BRIEFING ROADMAP

The briefing is divided into the five parts shown here. Most of the briefing will be spent on the third topic, describing and appraising the activities and accomplishments of the various forums.

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U.S. ARMY INTERNATIONAL ACTIVITIES

Category	DoD Agent	Army Functional Agent
Cooperative R&D, Acquisition, Production		
> General and Reciprocal MOUs	OASD(ISA)	AMCICP
> International Cooperative R&D Programs	ODUSD(IIP)	AMCICP
> NATO Defense Research Group	ODUSD(IIP)	AMCICP
> TTCP	ODUSD(IIP)	AMCICP
Information and Data Exchange		
> DDEP (DEAs and MWDDEP)	ODUSD(IIP)	AMCICP
> S&T Information Program	OASD(ISA)	SARD
> DDSP	ODUSD(IIP)	AMCICP
Personnel Exchanges and Training		
> Scientists and Engineers Exchange Program	ODUSD(IIP)	AMCICP
Political – Military Actions		
> Bilateral Staff Talks	USA	TRADOC (DCSCD)
> International Agreements	OAGC(I&I)	ODCSOPS
> MOUs/MOAs	ODUSD(IIP)	AMCICP/AMSAC
Rationalization, Standardization, Interoperability (RSI)		
> AGARD	USAF	AMCICP
> ASCC	USAF	AMCICP
> ABCA Armies Standardization Program	USA	AMCICP
> CNAD/NAAG/NAPR/PAPS	ODUSD(IIP)	SARD-IN
> Military Committee/MAS	OJCS	AMCICP
> Standardization Agreements (STANAG/QSTAG)	USA/USN/USAF	AMCICP
> SNR (Army)	ODUSD(IIP)	SARD-IN
Security Assistance		
> Coproduction/Dual Production/Licensed Production	OUSD(P)/DSAA	USASAC
> FMS and MAP Materiel	OUSD(P)/DSAA	AMSAC

(Source: AR 11-31)

U.S. ARMY INTERNATIONAL ACTIVITIES

International armaments cooperation covers a broad range of activities, with cooperative research and development (R&D) being only one of them. This chart summarizes how Army Regulation (AR) 11-31 categorizes various international activities and indicates that there is a triad of key Army players in the international arena: Army Materiel Command (AMC) (75% of international activities), the Army Staff (20%), and Training and Doctrine Command (TRADOC) (5% on a line item basis). The term "functional agent," incidentally, is defined in the AR as the *designated Army proponent*, responsible for policy, procedural guidance, and management of the specific international activity concerned. In actuality, who manages what is not quite in accordance with the stated responsibilities. For example, the AMC Office for International Cooperative Programs (AMCICP) does not, in the strict sense of the word, manage the Army's participation in NATO Defense Research Group (DRG, or the Technical Cooperation Program (TTCP).

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FORUM SELECTION CRITERIA

- "Institutional Forum for Armaments Cooperation": A formal body of national representatives of at least two nations, with definable membership and charter, meeting periodically for information exchange and discussion to:
  - harmonize operational concepts, doctrine, and procedures;
  - standardize materiel requirements;
  - explore opportunities for cooperative research, development, and acquisition; and/or
  - agree on specific cooperative projects;

  with minutes of meetings recorded for cognizant officials.
- Participation: United States and at least 1 other NATO nation
- Charter/Activity: Includes cooperative R&D in Army armaments technology base or weapons systems
- Functional Areas: 6 out of 17 TRADOC-defined functional areas
  - Field Artillery
  - Aviation
  - Air Defense Artillery
  - Communication-Electronics
  - Armor
  - Infantry
- Survey sample: Random selection within above parameters.

FORUM SELECTION CRITERIA

We picked the forums for our survey according to the criteria stated on this chart. First, we had to define what is meant by the term "forum." To my knowledge, there is no official definition in JCS Publication 1 or in any AR. The definition shown here excludes, for example, the annual review of bilateral data exchange annexes (DEAs) as a forum category, it also excludes the activities of AMC's Research, Development, and Standardization (RDS) Groups in several capitals. This does not say they are not important for international armaments cooperation; rather, it simply says they are not classified as forums for the purposes of this study. Second, we focused on forums for cooperation with one or more NATO allies, excluding other important partners in the defense area such as Israel and Japan. Third, we excluded any forums not intended to result in some form of cooperative R&D. Fourth, we decided to focus on a few functional areas. And finally, within the stratified sample thus defined, we picked a number of forums at random to stay within our schedule of work completion. Because the study sponsor was the U.S. Army, we limited our survey to Army forums, excluding numerous multi-service forums (except for technology base research).

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FORUM SURVEY SAMPLE[1]

Forum Parentage	Bilateral		Multilateral			
	Staff Talks	Standing Forums Under MOU/TOR[2]	Four Power SNR(A)	ABCA Armies	NAAG	MAS Army Board
Forum Population	4 WGs (U.S., GE)	6 bilateral WGs (U.S., FR)	6 WGs (U.S., FR, GE, UK)	19 QWGs (U.S., AS, CA, UK)	11 Panels (14 nations)	16 WPs (14 nations)
Survey Sample	AAWG	Electronics WG	all	AD Inf Armor Arty Avn STANO	PII-Combat Veh PIII-Infantry	Artillery WP
Coverage	25%	16%	limited info	30%	18%	6%

[1]Other forums not covered in detail: NATO DRG and TTCP.

[2]Excludes several *ad hoc* forums under specific cooperative technology/weapons system MOUs (bi-, tri-, and quadrilateral with FR, GE, UK)

FORUM SURVEY SAMPLE

The survey sample that we ended up with is shown in this chart. The headings show the forum parentage, which may be a higher-level body that supervises the subordinate forums or an agreement among national representatives or a program established among Governments. Our forum population falls under six headings. As noted at the bottom, this briefing will also cover NATO DRG and TTCP forums, but we did not survey those forums in detail because only limited information on their activities and accomplishments was available. Thus, from left to right we have the following categories of forums by parentage:

Bilateral Army Staff Talks. The U.S. Army conducts staff talks with the armies of many countries, but only the German Staff Talks have been structured with subordinate groups specifically created for the purpose of armaments cooperation. There are four such subordinate working groups (WGs) and our survey covers the most important one, the Army Armaments Working Group (AAWG).

Standing Forums created by Memorandum of Understanding (MOU) or Terms of Reference (TOR). This is a catch-all category that includes a variety of bi-, tri-, and quadrilateral forums that were created by a specific agreement or MOU. Most of these are *ad hoc* forums established to pursue cooperative R&D on a specific weapons system or technology area; many do not have written TORs, and we have excluded those from our survey. There is only one standing forum in this category with specific TOR that go well beyond any specific weapons system or technology area and that is the arrangement with France. There are six bilateral WGs, and our survey includes what your staff perceives as the most productive one, the Electronics WG.

Four Power Senior National Representatives (SNR) (Army). This Four Power forum category has six WGs. Our survey covers all six, but the level of detail we have collected is limited because the current focus of the WGs is not cooperative R&D.

American-British-Canadian-Australian (ABCA) Armies. This familiar forum category has 19 WGs; our survey covers 6 and in this briefing I will cover only 3 to avoid repetition.

NATO Army Armaments Group (NAAG). This is one of the "Main Groups" under the Conference of National Armaments Directors (CNAD) and is focused on army armaments cooperation. It has 11 subordinate panels and our survey covers 2. Originally, it was our intent to cover more but the voluminous documentation of these NATO panels and subordinate WGs did not permit examining more than a small sample.

Military Agency for Standardization (MAS) Army Board. The MAS is on the military side of NATO, and the Army Board is one of the three Service Boards of the MAS. It has 16 Working Parties (WPs), and our survey covers 1. We had been led to believe that these WPs do engage in fostering cooperative materiel R&D and that is why we included this category in our survey. We found out, however, that they do not, so we did not go further than the first WP surveyed.

The next 26 charts are devoted to a review of these forums in the same sequence, followed by 15 charts on the DRG and TTCP forums. For each category, I will try to cover the origin and purpose, the process or procedures, some of our findings, and our appraisal of accomplishments.

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BILATERAL ARMY STAFF TALKS

- Origin:
  - Correspondence/visits between GE and U.S. Army leadership, starting August 1974, seeking increased cooperation in equipment planning and development
  - CSA (GEN Weyand) tasking to CG, TRADOC (GEN DePuy) to develop framework for improved relationships between U.S./GE Armies, December 1974
  - After agreement with GE Army on proposed TOR, CG, TRADOC designated as executive agent of CSA for bilateral staff talks, and tasked to set up the bilateral program with CG, AMC (or designee) representing R&D community (June 1975)
- Evolution:
  - CG, TRADOC (GEN Starry) letter to VCSA (UK) proposing bilateral talks to harmonize concepts (April 1977); UK proposed trilateral (U.S., GE, UK), U.S. decided to keep it bilateral; DCSOPS letter to GEN Starry (December 1978) recommending talks be expanded to include materiel issues, subsequently approved by CSA
  - CSA letter to CG, TRADOC tasking him to explore bilateral talks with France (January 1979)
  - VCSA "RSI letter" tasking expansion of bilateral staff talks with allies (April 1979)
- Status:
  - 9 ST (GE, UK, FR, IT, SP, CA, BA, ROK, JAP)
  - Other bilaterals: IS, PRC, Peru, Argentina
  - Goals, objectives, and structure vary by country
  - TRADOC annual investment in bilateral programs: 26 manyears (ATCD-YE estimate)
  - Bilateral talks are 75% of TRADOC's IA; GE ST alone is 6 manyears/year

BILATERAL ARMY STAFF TALKS

The idea of Bilateral Army Staff Talks evolved in the mid-1970s when U.S. Army attention refocused from Vietnam to Europe. Starting with personal initiatives by top Army leadership, summarized under "Origin," the U.S. Army became engaged in staff talks first with Germany (GE), then the United Kingdom (UK), then France (FR). The general purpose was to foster closer relations and harmonize operational concepts. Importantly, the Commanding General (CG) of TRADOC was formally designated as the Chief of Staff, Army's (CSA's) executive agent for these talks. Currently, the U.S. Army has staff talks with the armies of nine countries; additionally, there are talks with four other countries but those are not formally designated as Staff Talks. According to the cognizant TRADOC office, International Army Programs Directorate (ATCD-YE), TRADOC invests approximately 35 manyears per year in its international activities, including 26 manyears on bilateral, and 9 manyears on multilateral (that is NATO, ABCA, and SNR). Thus, TRADOC's manyear investment in international activities is 75% bilateral, 25% multilateral. Of the bilaterals, the German Staff Talks (ST) account for the largest portion of TRADOC's investment: 6 manyears or 23% of TRADOC's total on bilateral talks. As I said, the German ST are the oldest, and by 1978 they had progressed sufficiently in harmonizing operational/tactical concepts that the two sides agreed that discussions could proceed to armaments cooperation. The structure that evolved is shown on the next chart.

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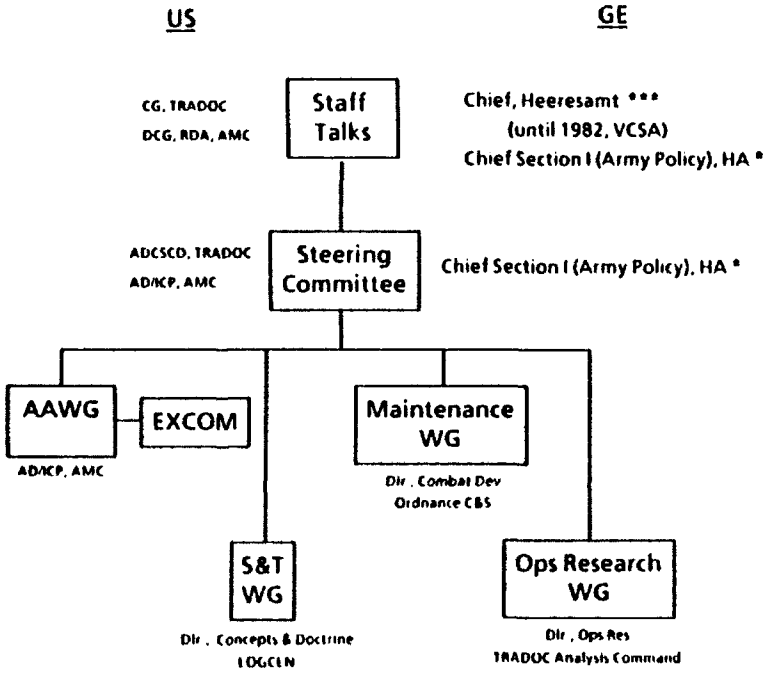
STRUCTURE OF BILATERAL COOPERATION WITH GERMANY



- First ST Oct 75; 1/year (2/year thru 1980)
- SC meets semi-annually to discuss routine matters and prepare agenda for ST (until 1982 also covered cooperation on "major items")
- Focus of ST:
  - Develop joint tactical concepts
  - Achieve tactical interoperability
  - Derive mutual weapon system requirements
  - Increase standardization of materiel
- Phases of cooperation:
  - Harmonized Concepts (18 bilateral concepts by 1986)
  - Definition of Materiel Requirements (MECDs)
  - Evaluation (wargaming/analysis)
  - Cooperative Fulfillment of Requirements (MOUs)
- Some important MOUs/MOAs:
  - M1/LEO II Harmonization
  - 155mm Ammo Interoperability
  - Future Armored Vehicle Research Program

- 1982 Reorganizations:
  - NMI group (est. 1978) became AAWG with increased scope ("major items")
  - EXCOM chartered to assist AAWG by providing continuity between meetings
  - EXCOM composed of (in accordance with TOR):
    - US: CDR, USARDSG-GE
      TRADOC LO to HA (observer status)
    - GE: Chief, Subdivision III-1, HA
      Chief, Subdivision KG-1, BWB

- Breakout of MOUs with GE by origin:
  - ST: 3 (standardization/interoperability)
  - SNR: 3 (IEX/standard test procedures)
  - AAWG: 3 (standardization/test procedures)
  - NAAG: 1 (codevelopment/coproduction)
  - Ad hoc: 6 (3 codevelopment/3 standardization)
  - Total: 16 (9 bilateral/7 multilateral)

STRUCTURE OF BILATERAL COOPERATION WITH GERMANY

Through 1982, the German delegation to the ST consisted of the Vice Chief of Staff, Army (VCSA) (***), general officers from their Deputy Chief of Staff (DCS) for Weapons Development (FüIIVII) and Plans (FüIIVI), and a senior official from the Federal Ministry of Defense (FMoD), Armaments Division (Land Materiel, RüIII). Those agencies were also represented on the Steering Committee (SC) that, *inter alia*, assumed responsibility in 1978 for pursuing opportunities for cooperation on so-called major items. Simultaneously, a separate WG was established in 1978 to pursue cooperative opportunities for non-major items (NMI), the NMI WG. Throughout this period, the U.S. Head of Delegation (HoD) to the NMI WG was the Assistant Deputy for International Cooperative Programs (ADICP) of AMC, who also represented AMC in the SC. His counterpart on the NMI WG was a brigadier general from Heeresamt, Abt. III, Army Materiel. This initial period at the ST/SC level was rather productive: some of the tangible results shown on the chart are the agreements on bilateral concepts (9 signed by CSA through January 1979, 13 by January 1981, 18 by January 1986, and 19 today) and a number of MOUs.

The three examples listed are not all the result of the ST. The first, tank harmonization, dates back to the basic MOU signed in 1974, but the second addendum to that MOU in February 1979 pertaining to the tank gun had some ST involvement even though U.S. adoption of the German 120mm tank gun was part of a political *quid pro quo* (including U.S. purchase of German nontactical vehicles and German equipment and labor for the European Telephone System) to continue German participation in the important NATO AWACS program. The second, howitzer and ammunition interoperability, refers to the so-called "ballistics" MOU signed in 1978 with GE, Italy (IT), and the UK and has nothing to do with this forum. The third was one of the products of the ST, but is a memorandum of agreement (MOA), not an MOU, and the work being done is outside the supervision of this forum. It was supplemented in September 1985 with an agreement on cooperative development of weapons systems for armor troops [known as the Armor Combat Development Engineering Program (ACDEP) charter] that was signed by the CG TRADOC and the German CSA initiating formulation of the Future Armor Combat System (FACS) and common military requirements separate from the AAWG.

If one were to look carefully at the MOUs currently in effect with GE, one would find two interesting facts: most MOUs are concerned with standardization, not cooperative development, and most are the result of what I call *ad hoc* forums, not the institutional forums. The specific statistics are shown at the right-hand bottom of the chart. The only codevelopment/coproduction MOUs in effect with GE are the Multiple Launch Rocket System (MLRS), Autonomous Precision Guided Munitions (APGM), helicopter flight controls, and advanced PATRIOT. None of those, as the record indicates, was the result of the bilateral forums (ST and AAWG) with GE. The six MOUs that can be credited to the ST and AAWG are:

- ST: Interoperability of tactical data systems, artillery fire control systems, and combat net radios
- AAWG: Camouflage paint, test procedures, and combat vehicle command and control (C^2).

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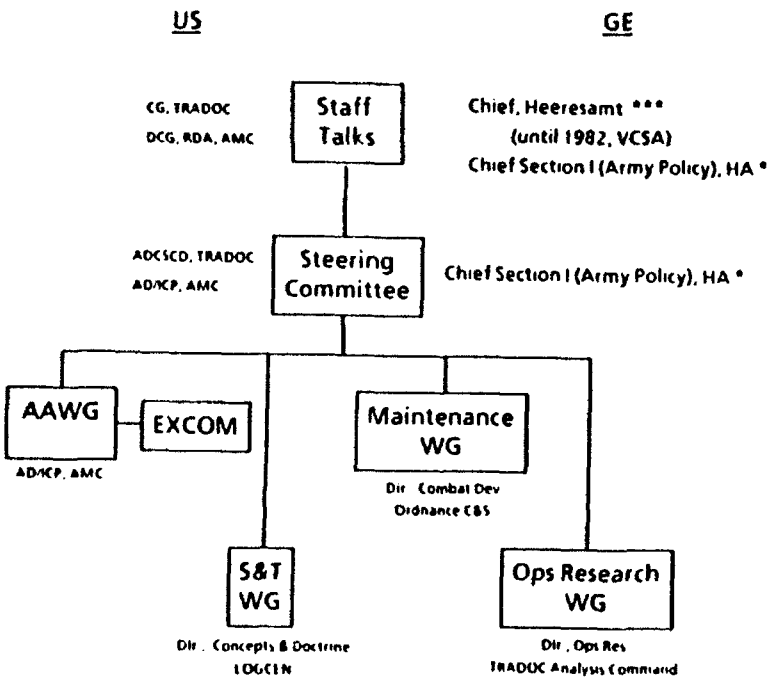
STRUCTURE OF BILATERAL COOPERATION WITH GERMANY



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  - Total: 16 (9 bilateral/7 multilateral)

STRUCTURE OF BILATERAL COOPERATION WITH GERMANY (continued)

The bottom left-hand refers to the reorganization that occurred in mid-1982. Germany decided to downgrade the level of ST/SC from FMoD to the Heeresamt, and, as a logical consequence of that restructuring, the NMI WG was expanded in scope to deal also with major items as the memberships on the SC and WG now overlapped. The resulting structure is illustrated on this chart. The U.S. HoD to AAWG meetings remained the ADICP of AMC, except for the November 1985 and February 1987 meetings when the lead role was given to the Office of the Deputy Chief of Staff for Development, Engineering, and Acquisition (DCS/DEA).

The charter for the AAWG was "to enhance interoperability and standardization with respect to development, procurement, and utilization of materiel of both Armies." The process that was adopted called for development and bilateral comparison of national materiel overviews by functional area, identification of common materiel requirements and gaps in capabilities, agreements on joint materiel needs in the form of Military Equipment Characteristics Documents (MECDs), and the pursuit of joint projects to fulfill those MECDs as well as to improve materiel interoperability. The materiel overview process turned out less successful than anticipated due to time and personnel constraints. By 1985, the focus of the AAWG shifted to interoperability analysis, especially in the command/control/communications/intelligence (C^3I) area, and common actions required to eliminate deficiencies. Throughout the entire period, no cooperative materiel development projects were agreed on (see the survey form in the appendix).

In the AAWG meeting of February 1987, the U.S. side proposed a restructuring of this forum. The proposal was to convert the AAWG into a top-level forum for the CG AMC (or his deputy) and his German counterparts to engage in substantive discussion and establish guidance for a number of subordinate WGs by functional area under the lead of AMC MSCs or PEOs at the 0-6 level. This would result in a structure similar to the French model, which I will discuss later. The German response to this U.S. proposal was unenthusiastic. It does seem, however, that some restructuring of the AAWG forum is required to overcome a mismatch between the objectives and responsibilities/authorities of the two delegations in view of the role of the Heeresamt in the defense organization in Germany.

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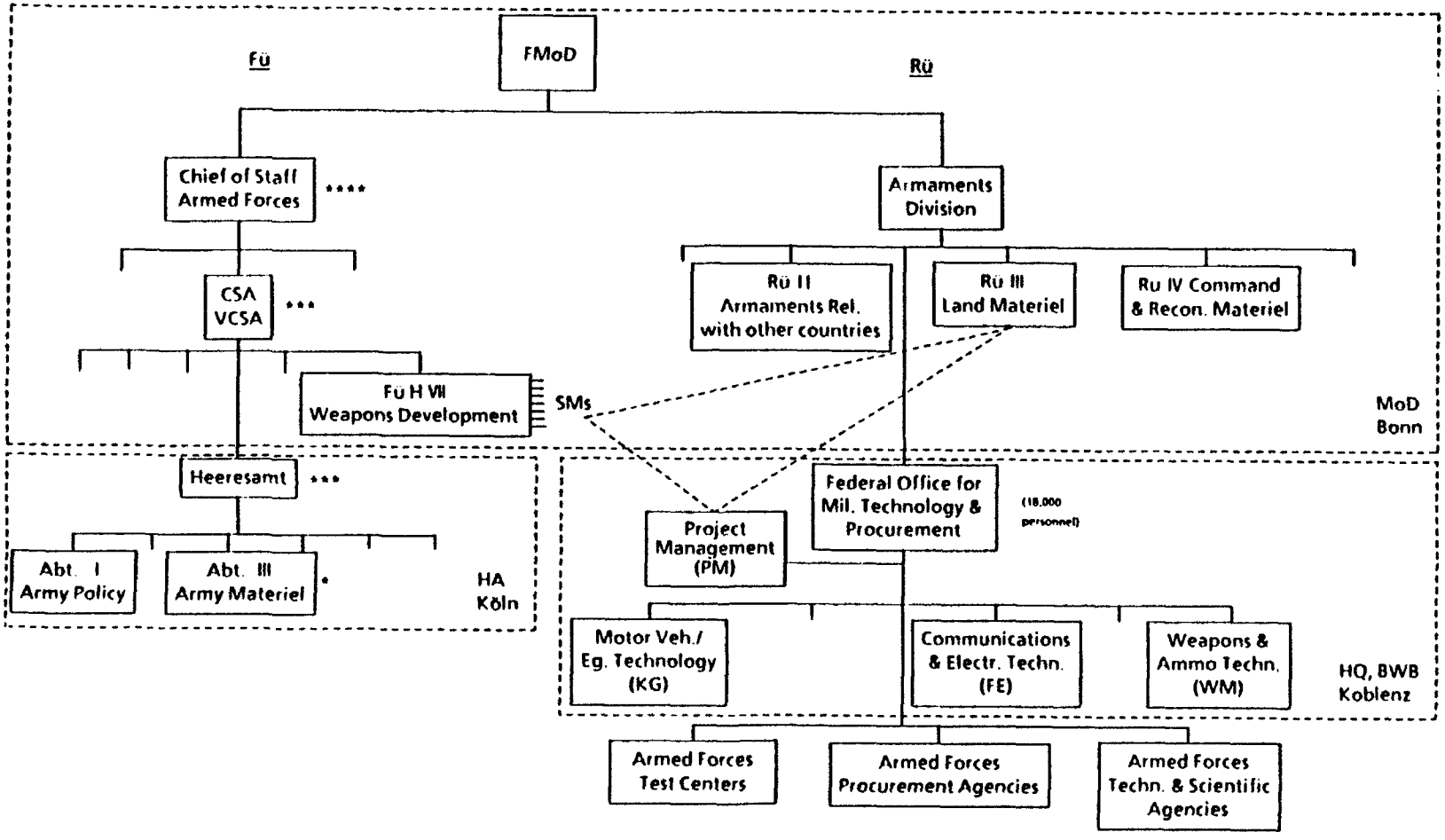
DEFENSE ORGANIZATION IN GERMANY



DEFENSE ORGANIZATION IN GERMANY

This chart illustrates the defense organizational structure in Germany. Heeresamt is the correct partner to TRADOC on bilateral concepts and weapons system requirements; it has little or no say, however, on whether and how those requirements are to be fulfilled. Acquisition is the domain of other players, specifically the DCS/Weapons Development (FüIIVII) reporting to the VCSA and the Directorate for Land Materiel (RüIII) reporting to the State Secretary or Deputy Minister for Armaments. Those two are the appropriate counterparts to AMC HQ with respect to armaments development, while the Bundesamt für Wehrtechnik und Beschaffung (BWB) would be the key partner in the technology area.

FINDINGS ON AAWG ACTIVITIES AND RESULTS

- More results in information exchange, standardization/interoperability, and reciprocal procurement than in cooperative R&D.
- Idea of MECD sound, but no follow-through after signed agreement.
- Probable mismatch between delegations – need to restructure.

FINDINGS ON AAWG ACTIVITIES AND RESULTS

My findings from the AAWG minutes of meetings and those of its predecessor, the NMI WG, are presented in more detail on the survey form in the appendix to this briefing. As indicated on this summary chart, the AAWG has achieved significant results in the form of information exchange, some agreements on standardization and interoperability, and a few reciprocal procurements of the other country's weapons, but little in cooperative R&D. None of the 13 signed MECDs (6 for major items, 7 for non-major items) has resulted in a signed MOU for cooperative development as originally intended, and the effort invested in identifying over 100 candidate items for cooperation has largely gone to waste. The root cause is a probable mismatch in objectives of the delegations. The Heeresamt is interested principally in standardization and interoperability, AMC is interested in cooperative R&D; the Heeresamt has no say in acquisition, AMC does. The 1987 U.S. proposal to restructure the talks with GE so far has not received an encouraging response. The model proposed was essentially that of the talks with France, which I will cover next.

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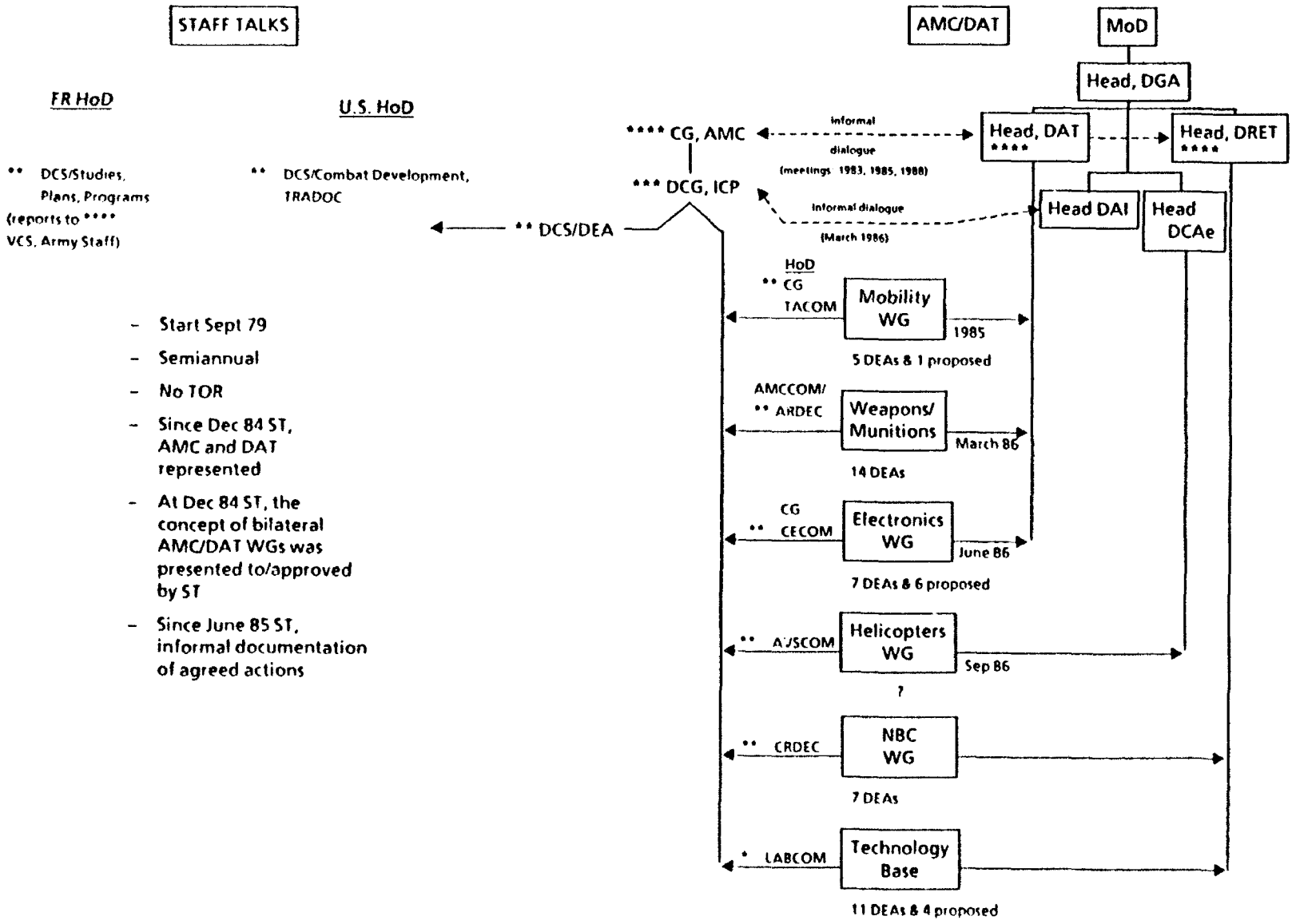
STRUCTURE OF BILATERAL COOPERATION WITH FRANCE



- Start Sept 79
- Semiannual
- No TOR
- Since Dec 84 ST, AMC and DAT represented
- At Dec 84 ST, the concept of bilateral AMC/DAT WGs was presented to/approved by ST
- Since June 85 ST, informal documentation of agreed actions

STRUCTURE OF BILATERAL COOPERATION WITH FRANCE

The ST with FR began in September 1979. Compared to the other bilateral ST, the talks with FR are very unstructured or flexible; as of January 1989 there were no formal TOR. By 1984, both sides agreed the talks should extend to materiel issues, and, since December of that year, representatives of AMC and its French counterpart, Direction des Armements Terrestres (DAT), have attended the ST. Both delegations agreed to the idea to create a number of materiel WGs under the auspices of AMC and DAT, separate and independent from the ST. That idea had been worked out in informal talks between CG AMC and French authorities involving the General Armaments Directorate (Fr: Délégation Générale des Armements or DGA) and three of its subordinate directorates: DAT; the R&D directorate [Direction du Recherche, des Etudes, et des Techniques (DRET)]; and International Affairs (Direction des Affaires Internationales). In 1985 and 1986, six WGs were created along commodity lines. For each of these WGs, the chart shows the date of the first meeting and the number of DEAs in effect in its technology area. The Commander of the cognizant MSC is the U.S. HoD for these WGs. Each of the WGs has TOR that define the primary purpose as exchange of information, invigoration of existing DEAs, and initiation of new DEAs. Responsibilities have been established at three levels. At the top, CG AMC and Director DAT provide overall direction and guidance. They meet as needed by mutual consent and review progress of WGs as reported to them through their national HoDs. This was planned to take place on a two-year cycle (the most recent meeting was March 1988). At the second level, MSC commanders and their French counterparts control the program. At the third level, subgroups are responsible for working-level technical interaction within the guidance and structure determined by the higher levels. The second level is perceived as the critical one for successful cooperative efforts. We picked one of the WGs, the Electronics Equipment WG, for our survey. This was reported to be the one most productive to date.

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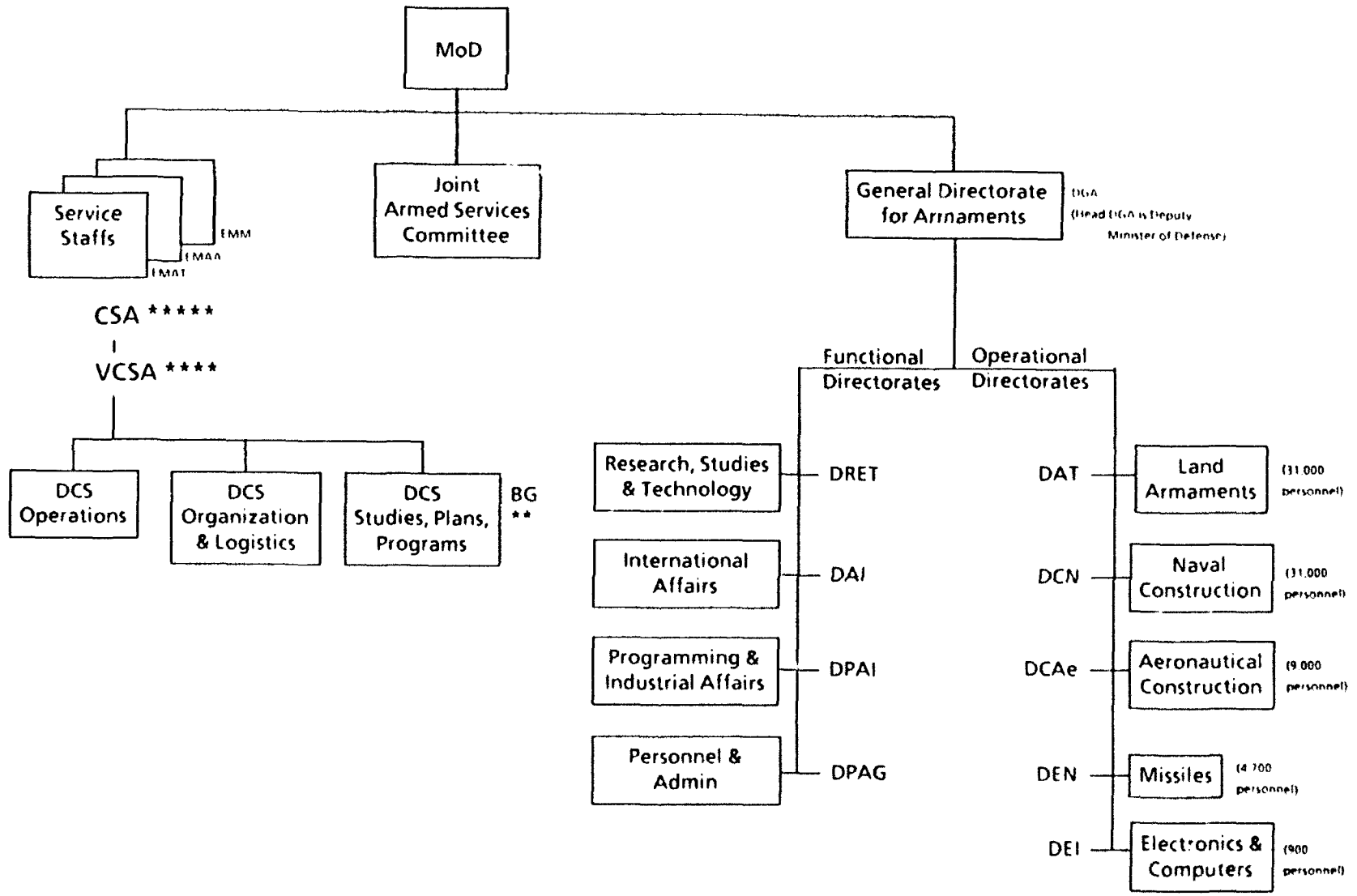
DEFENSE ORGANIZATION IN FRANCE



DEFENSE ORGANIZATION IN FRANCE

This chart shows the defense organizational structure in France. Like the Germans, the French have a centralized materiel procurement organization headed by a Deputy Minister of Defense, the DGA. There are a number of functional and operational directorates as shown on the chart. DAT is the largest of five operational directorates. DAT is responsible for land-based defense equipment (including vehicles, armaments, engineering equipment, mines, electronics, etc.) and works essentially for the ground forces as a partner to the military authorities. It also conducts R&D in future technology. The number of people in DAT shown on the chart includes 3,000 staff while the other 28,000 are employees in various government-owned plants, technical centers, and the central contracting department. DAT is subdivided in commodity-area divisions. For example, the counterpart of the Commander CECOM in the AMC/DAT forum is the Head of a division within DAT called SEFT (Section d'Etudes et Fabrications des Télécommunications) at Fort d'Issy near Paris. The head of SEFT, like DAT, is what the French call an ingénieur générale de l'armement, IGA, with general officer status but in civilian clothes. DRET, also headed by an IGA, has both functional and operational roles. Functionally, it coordinates research (6.1 and 6.2) for the three Services; operationally, it executes a portion of this research program either in-house or with industry or university support. It supervises a dozen research and technology centers in France. The Direction des Constructions Aéronautiques (DCAé) performs the same role as DAT but for aviation materiel. Its helicopter section is the counterpart to AVSCOM in the Helicopter WG. We examined the minutes of meetings of the Electronics WG and found the information summarized on the next chart.

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FINDINGS ON AMC/DAT ELECTRONICS WG ACTIVITIES AND RESULTS

- Focused on intensifying technical data exchange, not cooperative R&D.
- Harmonization of requirements (through ST) and improved data exchange may well foster cooperative projects downstream.
- Result of the 6 WGs at end 1988 was 1 MOU for cooperative R&D (NBC WG: laser standoff chemical detector, unsigned as of December 1988).

FINDINGS ON AMC/DAT ELECTRONICS WG ACTIVITIES AND RESULTS

The survey form presented in the appendix records the activities of the first two meetings, June 1986 and May 1987. Before the first meeting, there were 42 Army bilateral data exchange annexes (DEAs) in effect with France. The first meeting was focused on a review of 8 DEAs in the communications-electronics area. Both sides gave presentations on related national programs and studies and reached agreement on various revisions to the DEAs to be pursued through the national Technical Project Officers (TPOs) for the DEAs. In discussions about tactical data systems (two DEAs), both sides agreed that interoperability of national systems (SIGMA and SACRA) is essential and made reference to the quadripartite MOU on defining the interface being drafted under auspices of the Senior National Representatives, Army [SNR(A)] and reconfirmed the need for such an MOU. The meeting resulted in agreement on four new DEAs, consolidation of some existing DEAs, and reactivation of other DEAs. Also, the HoDs reviewed and approved the draft TOR. In the second meeting, the final TOR were signed by the two HoDs, national programs were presented, and the status of all DEAs, both active and in draft form, were reviewed. This review encompassed five active DEAs, eight new ones (including the four drafts from the previous meeting), and four old ones to be canceled. In addition, it was agreed that one existing DEA on integrated circuit (IC) technology would be outside the scope of this forum, being a LABCOM (6.2/6.3 R&D) and not a Communications-Electronics Command (CECOM) DEA. Areas identified for future discussions included interoperability of tactical radios and possible use of the Enhanced Position Location and Reporting System (EPLRS) as a Battlefield Management System (BMS) for French tank units. Both sides agreed that the possibility for cooperation in development of the next generation of high frequency (HF) radios should be examined. The results of this forum up to the end of 1988 are summarized on the survey form: only one potential candidate for cooperative R&D, but two proposed or reconfirmed areas for standardization to ensure interoperability, and eight new DEAs in communications-electronics.

As indicated in this summary chart, the present focus of this forum is data exchange, not cooperative R&D projects. In due time, it is possible the latter may result from concept harmonization in the ST and increased data exchange in the WG. The only tangible result to date from all six WGs with France is one MOU for cooperative R&D produced by the nuclear, biological, and chemical (NBC) WG. There are a number of other MOUs with France, but they were not the result of these WGs. The only other current bilateral MOU with FR concerns cooperative R&D in helicopter dynamics, negotiated by the Aviation Systems Command (AVSCOM), but it was completed before the first meeting of the Helicopter WG.

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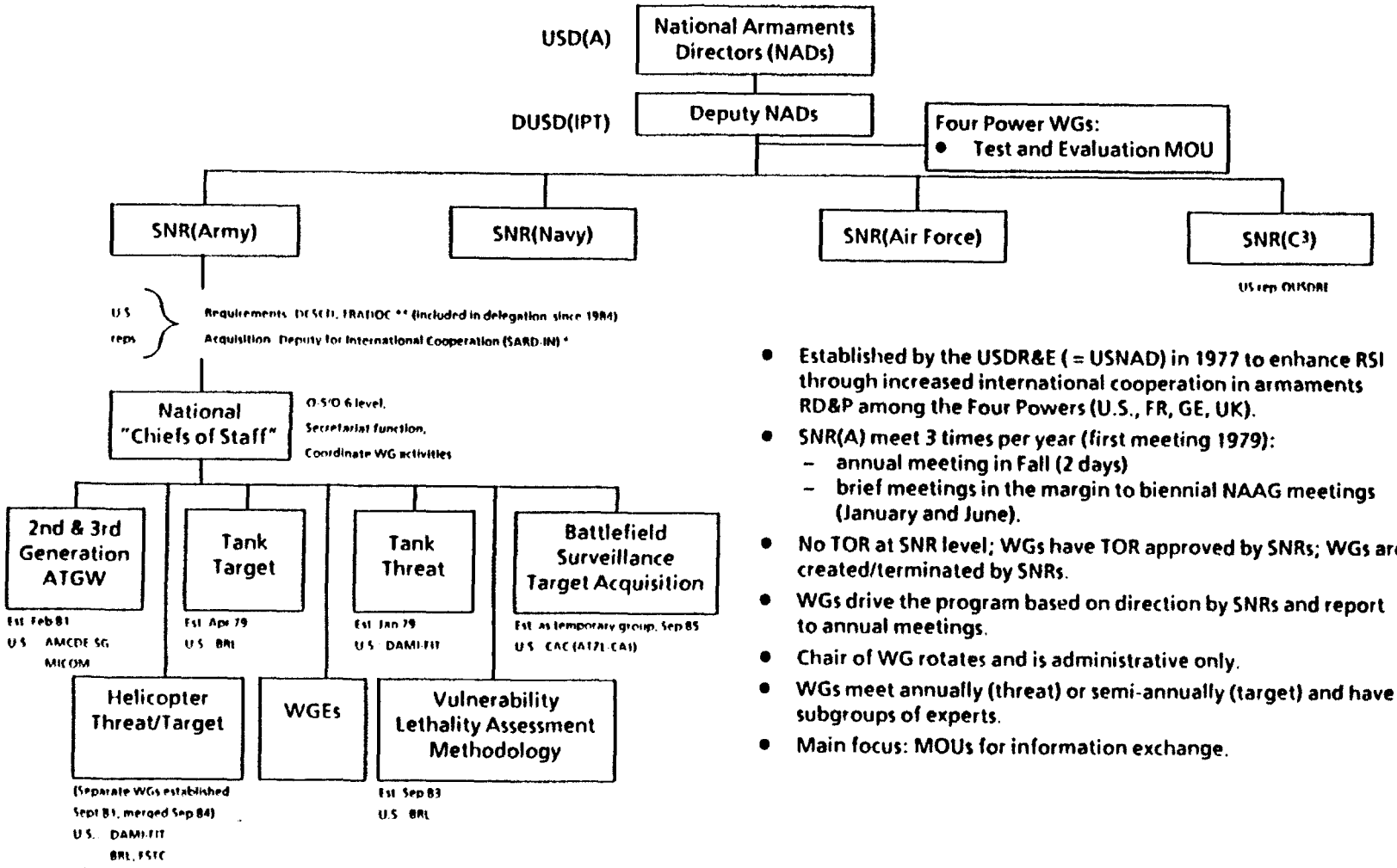
STRUCTURE OF SENIOR NATIONAL REPRESENTATIVES (ARMY)



- Established by the USDR&E (= USNAD) in 1977 to enhance RSI through increased international cooperation in armaments RD&P among the Four Powers (U.S., FR, GE, UK).
- SNR(A) meet 3 times per year (first meeting 1979):
  - annual meeting in Fall (2 days)
  - brief meetings in the margin to biennial NAAG meetings (January and June).
- No TOR at SNR level; WGs have TOR approved by SNRs; WGs are created/terminated by SNRs.
- WGs drive the program based on direction by SNRs and report to annual meetings.
- Chair of WG rotates and is administrative only.
- WGs meet annually (threat) or semi-annually (target) and have subgroups of experts.
- Main focus: MOUs for information exchange.

Tangible results of Four Power forum in cooperative R&D arena include MLRS MOU (July 1979) and progress with MOU on APGM, signed by 8 nations April 1987

STRUCTURE OF SENIOR NATIONAL REPRESENTATIVES (ARMY)

The next forum category is the SNR(A). This chart shows the overall structure and some of the background information on this forum. The Four Power forum was conceived by the Under Secretary of Defense for Research and Engineering (USDR&E), Dr. Perry, in the late 1970s as a kind of mini-Conference of National Armaments Directors (CNAD) between the four major industrial powers in NATO to foster increased standardization and more cooperation in R&D and acquisition on the model of "families of weapons." Negotiations on the first "family," air-to-air missiles, began in 1978 and were concluded with the signing of the Advanced Medium Range Air-to-Air Missile/Advanced Short Range Air-to-Air Missile (AMRAAM/ASRAAM) MOU in April 1980. Although we have not had access to the minutes of meetings of the SNR(A), we believe the first meeting took place in 1979 under the express directive of the four National Armament Directors (NADs) to explore a similar agreement for Anti-Tank Guided Missiles (ATGM). The SNRs found that such an agreement would not be feasible and instead agreed to exchange information on national programs, with the resulting MOUs ultimately signed in mid-1980. They also agreed that a permanent body at this level would be useful for dialogue and information exchange outside the broader NATO forums. They set up a number of subordinate WGs, which came into effect in 1979, each with specific TOR. The currently active WGs are shown on this chart: five permanent and one temporary WG. Because the information concerned is sensitive, the vehicle authorizing information exchange is the MOU. There are currently three MOUs in effect, two ATGM MOUs (an extension of the second generation ATGM MOU signed in 1980 and a third generation ATGM MOU) and the MOU on Vulnerability/Lethality Assessment Methodology (VLAM). With the exception of the VLAM WG, which has a permanent U.S. chair, the WGs have rotating chairmen, with the role being assigned to the nation hosting the meeting. In contrast to NATO bodies such as the NATO Army Armaments Working Group, there is no pilot or lead nation that directs the group effort. The threat groups meet annually; the target groups semiannually. Since September 1984 the tank target and threat groups also include the ATGM target and threat. The helicopter threat and target groups were combined into one group in 1984 and renamed "Combat Helicopter Vulnerability Assessment Group" in 1987 with expanded TOR. The work of all these permanent groups is focused on information exchange. In contrast, the temporary group on Battlefield Surveillance and Target Acquisition (BSTA), established in 1985, was directed by the SNR(A) to identify areas of commonality and explore possibilities of cross-procuring equipment to satisfy national requirements. This group was scheduled to present its final report to SNR(A) in November 1988, but is expected to continue work in tactical C^3I issues for the SNR(A).

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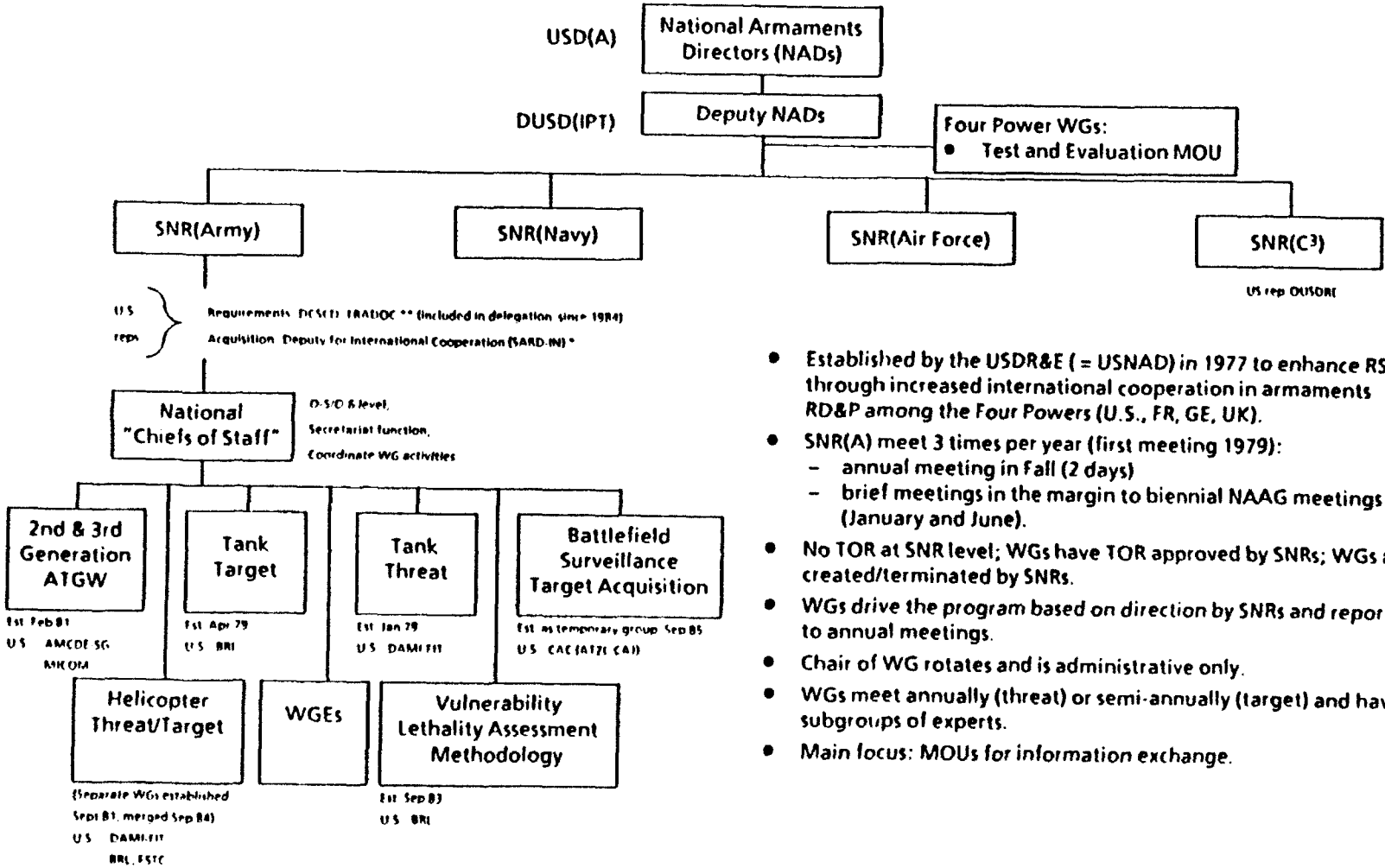
STRUCTURE OF SENIOR NATIONAL REPRESENTATIVES (ARMY)



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Tangible results of Four Power forum in cooperative R&D arena include MLRS MOU (July 1979) and progress with MOU on APGM, signed by 8 nations April 1987

STRUCTURE OF SENIOR NATIONAL REPRESENTATIVES (ARMY) (continued)

Not shown on the chart are various WGs that resulted from recent SNR(A) decisions. For example, in their November 1987 meeting, the SNR(A) decided to establish a new Working Group of Experts (WGE) on future tank main armament interoperability, which incorporates the current trilateral WG under the Tripartite Tank Components Committee (FR, GE, UK), and a new WGE on tactical trainers. In view of their slow progress they also established an examination of NAAG Project Groups (PGs) 23 and 24 to determine how SNR(A) can oversee the work of those two groups (vehicle-mounted mine locators, which is a U.S.-lead PG working on a NATO Staff Requirement (NSR), and scatterable mine clearing device, a UK-lead PG).

In summary, the SNR(A) itself and its subordinate groups represent forums for information exchange, especially information deemed too sensitive for NATO-wide dissemination. There are no tangible results in cooperative R&D. On the other hand, the Four Power forum at the NAD/Deputy NAD level can be credited with a few important achievements: MLRS, overcoming resistance to the APGM MOU, and a number of standardization MOUs.

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AMERICAN-BRITISH-CANADIAN-AUSTRALIAN (ABCA) ARMIES STANDARDIZATION PROGRAM

Origin:

- 1947 "Plan to Effect Standardization" initiated between U.S., CA, and UK Armies
- 1954 "Basic Standardization Concept"
- 1964 Australia joined and the "Basic Standardization Agreement" was ratified, formally establishing the ABCA Program
- 1965 By invitation, NZ became associated with the program through Australia, but has observer status (not signatory to BSA)

Aims:

- Foster collaboration among the four Armies
- Achieve highest possible degree of operational compatibility/interoperability among the four Armies through materiel and nonmateriel standardization
- Obtain greatest possible economy by use of combined resources and efforts

Organization:

- TEAL (VCSA level meeting every 18 months): provides guidance and direction
- WSO (GO-level): national officers, duty stations Washington, meet once a month, responsible for management of the program
- PSO (O5-level): full time management office, composed of national Army representatives and clerical support
- NSO: each Army's national coordination point for the program
- Stan Reps: each Army's national standardization reps located in the other 3 capital cities
- QWGs: established by ABCA Armies and WSO to perform the actual work, meeting every 18 months, with much of the work conducted between meetings by correspondence

AMERICAN-BRITISH-CANADIAN-AUSTRALIAN (ABCA) ARMIES STANDARDIZATION PROGRAM

The next forum is the ABCA Armies Standardization Program and its subordinate Quadripartite Working Groups (QWGs). This chart summarizes the background, aims, and organizational structure. One of the official aims is to obtain maximum economy by using combined resources and efforts, including cooperative R&D in weapons system development. The ABCA Program has a multi-level organizational structure that includes, from the top down: TEAL, a nickname for the meeting every 18 months of the Vice Chiefs of Staff of the four participating Armies; the Washington Standardization Officers (WSO), who are responsible for managing the program in accordance with TEAL guidance; and the Primary Standardization Office (PSO), which supports the WSO. The organizational structure is illustrated on the next chart.

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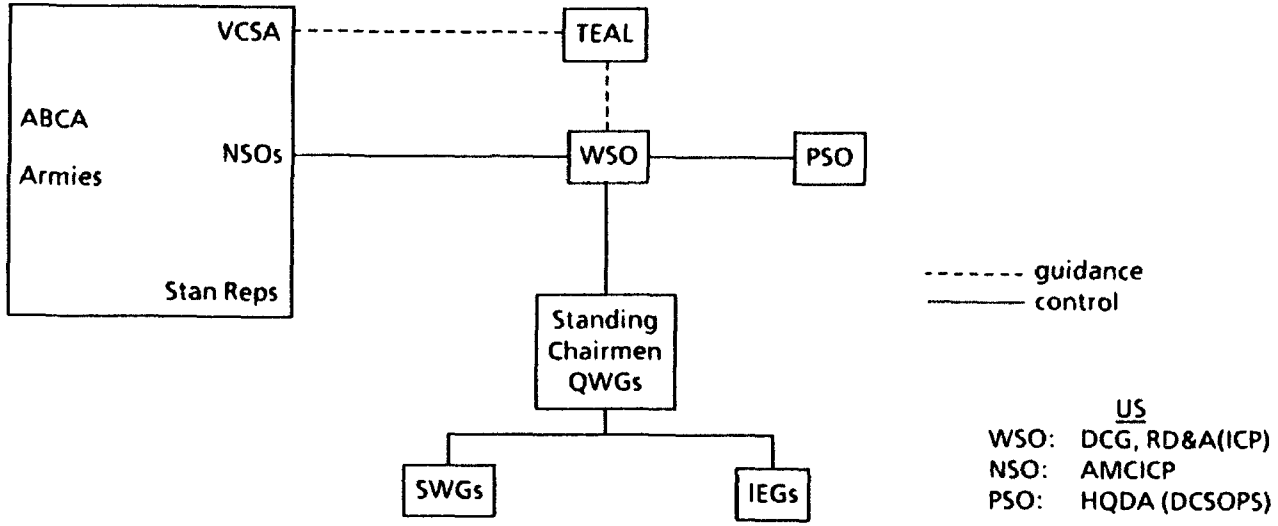
ABCA ARMIES PROGRAM ORGANIZATIONAL STRUCTURE



TEAL Guidance (examples):

- XXIV (April 1983):
  - Shifted emphasis in ABCA to lower intensity conflict
  - Reaffirmed priorities for interoperability in C^3, cross-servicing, battlefield STA systems, components and spare parts, and ammunition interchangeability
  - Directed greater emphasis on logistics and training
- XXVI (June 1986):
  - Adopted "Initiatives for the 90s" with emphasis on application of high technology
  - Directed QWGs to perform effectiveness assessment and develop a program strategy

ABCA ARMIES PROGRAM ORGANIZATIONAL STRUCTURE

The actual work is done by the QWGs. Each QWG has a standing chairman whose appointment is approved by the WSO. QWGs may create subordinate special working groups (SWGs) or information exchange groups (IEGs) subject to WSO approval. Like TEAL, QWGs meet on an 18-month cycle. Meetings follow a standard agenda and are documented in lengthy reports. It is a very formalized program with detailed documentation requirements: ABCA Handbook, Quadripartite Standing Operating Procedures (QSOPs), and TOR for each QWG and subordinate group. The U.S. delegation to TEAL is headed by the VCSA and normally includes TRADOC and HQDA representatives as principals. AMC is represented in the TEAL as the U.S. WSO who is the DCG, RD&A or normally one of his deputies. Examples of TEAL guidance are shown at the bottom of the chart: the 24th TEAL, in April 1983, redirected the thrust of the ABCA Program to lower intensity conflict (i.e., limited conventional war and below) because the program was essentially duplicating the work of several NATO forums. This redirection shifted the focus of ABCA from Europe to the Pacific Basin. It also reaffirmed the importance of interoperability and the priorities for interoperability among the four Armies. The 26th TEAL, in June 1986, emphasized various initiatives for the 1990s, including the application of emerging technologies (ET), and directed WSO to have QWGs evaluate measures of effectiveness and develop a program strategy for achieving interoperability. The 27th TEAL, in November 1987, directed implementation of the approved strategies; the 28th TEAL, in March 1989, will witness the first brigade-level field training exercise, dubbed CALTROP, at the Hunter-Liggett Military Reservation, which will evaluate various Quadripartite Standardization Agreements (QSTAGs), and provide a baseline measure of the extent interoperability has been achieved.

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ABCA STANDARDIZATION PROGRAM QUADRIPARTITE WORKING GROUPS (QWGs)

1. AIR DEFENSE (AD)[a]
2. AUTOMATION INTEROPERABILITY (AI)[b]
3. ARMY OPERATIONAL RESEARCH (AOR)[b]
4. ARMOR (Armor)[a]
5. AVIATION (Avn)[c,d]
6. COMMUNICATIONS (Comms)[c]
7. COMBAT DEVELOPMENT (CD)[a]
8. COMMAND AND CONTROL (Comd/Con)[a]
9. ENGINEERING STANDARDIZATION (ES)[c]
10. ELECTRONIC WARFARE (EW)[b,e]
11. ENGINEERS (Engr)[a]
12. HEALTH SERVICE SUPPORT (HSS)[b]
13. INFANTRY (Inf)[a]
14. INTELLIGENCE (Int)[b]
15. LOGISTICS (Log)[b]
16. NUCLEAR-BIOLOGICAL-CHEMICAL DEFENSE (NBCD)[c,f]
17. PROOFING, INSPECTION & QUALITY ASSURANCE (PIQA)[c,d]
18. SURFACE-SURFACE ARTILLERY (S-S Arty)[a]
19. SURVEILLANCE, TARGET ACQUISITION & NIGHT OBSERVATION (STANO)[a,d]
20. ELECTRICAL POWER SOURCE (EPS) (recently terminated)

a TRADOC HoD
b HQDA HoD
c AMC HoD
d AMC provides Standing Chairman
e JCS provides Standing Chairman since 1988
f TRADOC provides Standing Chairman

	TRADOC	AMC	HQDA
HoDs	8	5	6
SC	1	3	–

ABCA STANDARDIZATION PROGRAM QUADRIPARTITE WORKING GROUPS (QWGs)

This chart shows the 19 QWGs that are currently in active status (QWG 20 was recently terminated). The table at the bottom summarizes the U.S. participation in these QWGs: the U.S. Army provides 4 standing chairmen and the Office of the Joint Chiefs of Staff (JCS) provides 1; chairmen of the other 14 QWGs are either Australian, Canadian, or British; most are military, grade 0-5 or 0-6. The U.S. HoDs to the QWGs are distributed among TRADOC (8), AMC (5), and HQDA (6). The five QWGs where AMC provides the HoD are: Aviation (AVSCOM), Communications (CECOM), Engineering Standardization (HQ AMC), NBC Defense [Chemical Research, Development and Engineering Center (CRDEC)] and Inspection and Quality Assurance (QA) [Armaments Research and Development Command (ARADCOM)]. The entire program is focused primarily on standardization and interoperability, and this is reflected in the TOR of all QWGs. Standardization, in the ABCA process, essentially proceeds in five steps that are summarized on the next chart.

ABCA STANDARDIZATION PROCESS PHILOSOPHY

(1) CD Guide
- Developed by QWG/CD, defines operational concepts and required capabilities (to influence nat'l ROCs)
- GCs and QOs, listed in Guide, to guide QWGs in standardization tasks

(2) Concept Papers
- Developed by each QWG based on assigned QOs to influence future equipment/organization/doctrine
- Following QWG (not Armies) agreement, draft concept/working papers become "current concept papers," promulgated in MFR and maintained in PSO/NSO libraries; also listed in Handbook

(3) Commenting Procedure
- Armies circulate requirements documents at draft stage so that changes can be made early enough to influence standardization of materiel
- QWG also a forum for comments

(4) STAN List
- Cooperative R&D list: records items for which Armies desire standardization through participation in cooperative R&D efforts
- Information list: records national items of current equipment or those matching stated requirements for which Armies are not prepared to consider cooperative R&D at this stage
- Research list: records R&D projects in which at least one other Army holds an interest
- Represents the central document for information release with access authorized to listed items subject to National Disclosure Policy

(5) QSTAG
- Final step in standardization process; developed between 2 or more Armies to define agreements in materiel and nonmateriel fields
- QWG assigns custodian Army for each QSTAG; PSO allocates numbers and arranges ratification/publication process
- Nonmateriel QSTAGs (46%) generally based on concept papers

ABCA STANDARDIZATION PROCESS PHILOSOPHY

The first step is the Combat Development (CD) Guide developed and continuously updated by the QWG/CD. It describes operational concepts for future combined operations by ABCA Armies and defines quadripartite objectives (QOs) (similar to mission areas) and general capabilities (GCs) (similar to functional areas). Thus, within each GC, the associated QOs are assigned to one or more QWGs. The ABCA Manual currently lists 17 GCs and 29 QOs. Based on that conceptual framework, QWGs prepare working papers that become draft concepts and ultimately approved concept papers that define how those QOs can be met by standardized doctrine, operating procedures, and equipment characteristics. This is the second step, with most of the work involved being done through correspondence between scheduled QWG meetings. A third step in the standardization process is the so-called "commenting procedure," whereby the Armies circulate national draft requirements documents for comments. Similarly, at QWG meetings, a portion of the agenda normally involves national presentations on R&D programs for information exchange. The fourth step is the Standardization (STAN) List, which, as the chart indicates, lists national R&D projects in which participation by other armies is invited, items of currently fielded equipment for information exchange purposes, and national R&D projects in which at least one other Army has expressed an interest. Every QWG meeting has on its agenda a review and update of the STAN List. The final and most tangible step in the standardization process is the drafting of standardization agreements or QSTAGs when at least two armies can agree on certain standardized procedures or materiel. The QSTAGs that have been generated by the program are about 50-50 in the materiel and non-materiel areas. To give you some idea of the QWGs' attention to documentation, let me take the example of the QWG/AVN.

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ILLUSTRATION OF DOCUMENT HIERARCHY: QWG/AVN

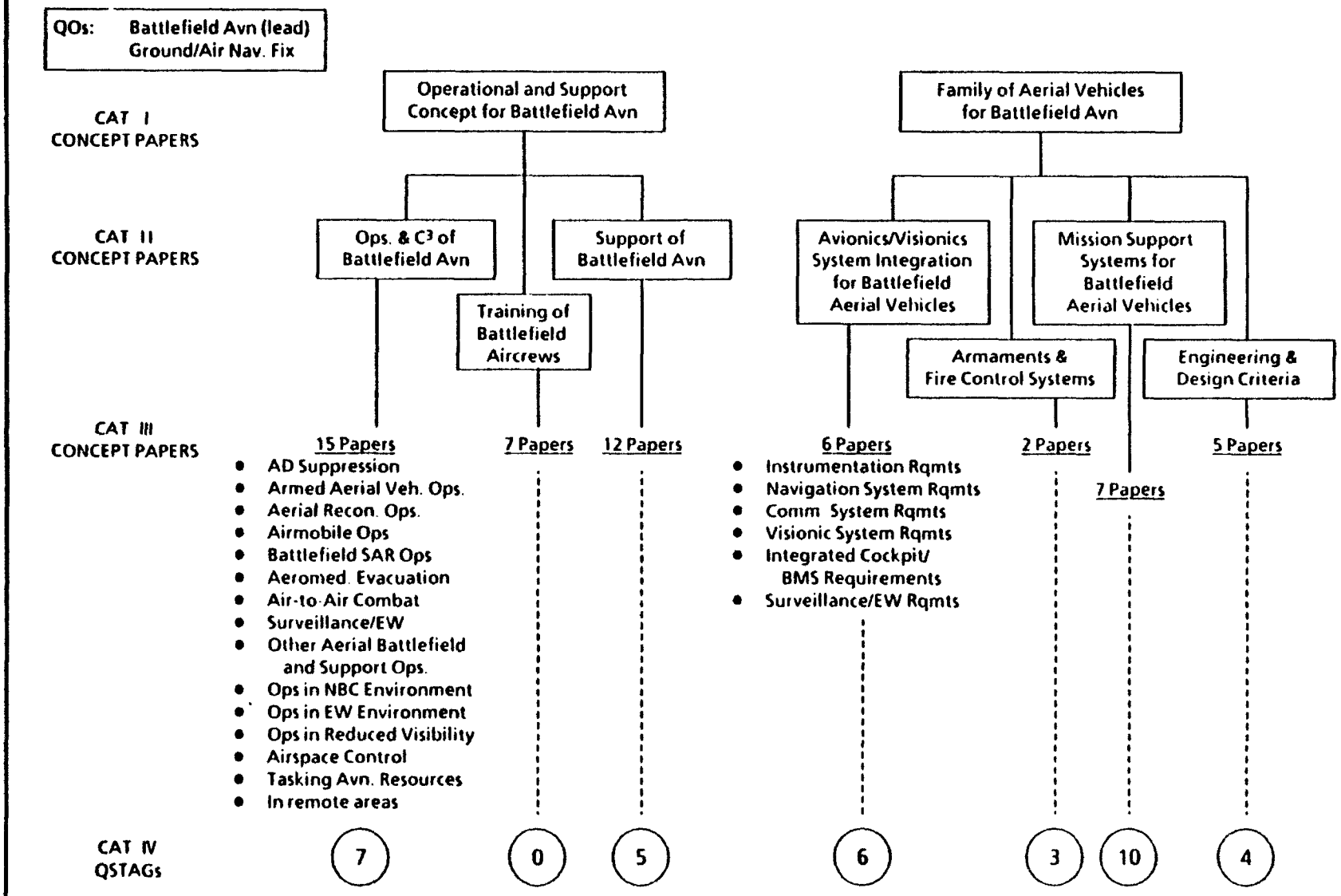

ILLUSTRATION OF DOCUMENT HIERARCHY: QWG/AVN

This QWG has a total of 63 concept papers (CPs) on the books, divided in three classes, and 35 QSTAGs in various stages of development, draft, or final. Cat I CPs define the scope of the subject and conclude with a list of topics suitable for Cat II CPs; Cat II CPs are sufficiently detailed that either a QSTAG or a Cat III CP can be recommended; Cat III CPs give more specific parameters or factors (e.g., for materiel, a Cat III CP might define interface data or form/fit/function-type characteristics). The notion is that a Cat III CP either identifies areas for standardization agreements or must be further developed as necessary. This particular QWG, in its recent interoperability assessment, concluded that there was one critical gap in 1987, and that gap was in the area of airspace control. Another QWG, QWG/C2, was required to develop a QSTAG to close that gap. The QWG also noted, however, that other critical gaps in interoperability still were being identified as Cat II and III CPs were being developed and expanded.

FINDINGS ON QWG ACTIVITIES AND RESULTS

Charter: Scope of work and responsibilities in TOR include cooperative R&D, but stated objectives do not include identification/recommendation of cooperative R&D opportunities/needs.

Activity: QWGs focus on concept papers, QSTAGs, information exchange, and harmonizing future equipment requirements. Stated work priorities exclude anything on cooperative R&D.

Results:

- Updated concept papers, QSTAGs, and STAN List.
- STAN Lists of each QWG consist primarily of fielded equipment.

Recent Trends:

- Recognition that STAN List should include future equipment (i.e., R&D projects), not just fielded equipment, to enhance opportunity for standardization (WSO guidance, 1987).
- Emphasis on "program strategy to ensure that by 1995 a deployed ABCA force will be capable of operating together effectively, with full interoperability by 2005" (TEAL, May 1986).
- Increasing indications of coordination problems among related QWGs (combined arms).
- CALTROP brigade-level exercise in 1989 to demonstrate interoperability/evaluate QSTAGs.

Finding: With two possible exceptions (bilateral MOUs with UK: interoperable datalinks with airborne surveillance radars, now a trilateral Nunn program, and performance standards for EO countermeasures, also a Nunn program), there is no evidence that ABCA QWGs have been used as forum for spawning cooperative R&D agreements.

Details: See Survey Forms (Total QSTAGs: 406; USA-ratified: 327; TRADOC: 112, AMC: 178; TSG: 27).

FINDINGS ON QWG ACTIVITIES AND RESULTS

Our findings on QWG activities and results are summarized on this chart. I have filled out three survey forms on Armor, Artillery, and Infantry QWGs. From the available record it is clear that neither the stated objectives for the QWGs, nor their stated work priorities, nor their actual activities address cooperative R&D, even though cooperative R&D falls within their charters in accordance with the TOR. Most activity is focused on information exchange and standardizing operational concepts, procedures, and materiel. Some recent trends are noted on the chart: the WSO recently concluded that efforts devoted to maintaining and updating the STAN List were essentially wasteful because most of the items on the STAN List were fielded equipment; thus, it urged the QWGs to place more emphasis on identifying national R&D projects on the list to foster opportunities for standardization of future equipment. Pursuant to TEAL guidance, the main emphasis of the ABCA Program has now shifted to the achievement of interoperability of ABCA Armies by the year 2005. There are some indications of coordination problems, both among QWGs and between certain QWGs and other bodies outside ABCA Armies [e.g., QWG/Aviation and the Air Standardization Coordinating Committee (ASCC), which is the Air Force counterpart to the ABCA Armies Program]. The bottom line is that there is no evidence that ABCA QWGs have been a forum for generating cooperative R&D agreements. There is one caveat to that finding. The records for the six QWGs we examined do show two references to cooperative MOUs, both in the QWG/STANO area, as indicated on the chart. It is possible that those two MOUs, while developed outside the ABCA forum, were actually the result of information exchanges within the QWG/STANO. More detailed quantitative information on results from the QWGs (numbers of QSTAGs, numbers of CPs) are presented in three survey forms in the appendix.

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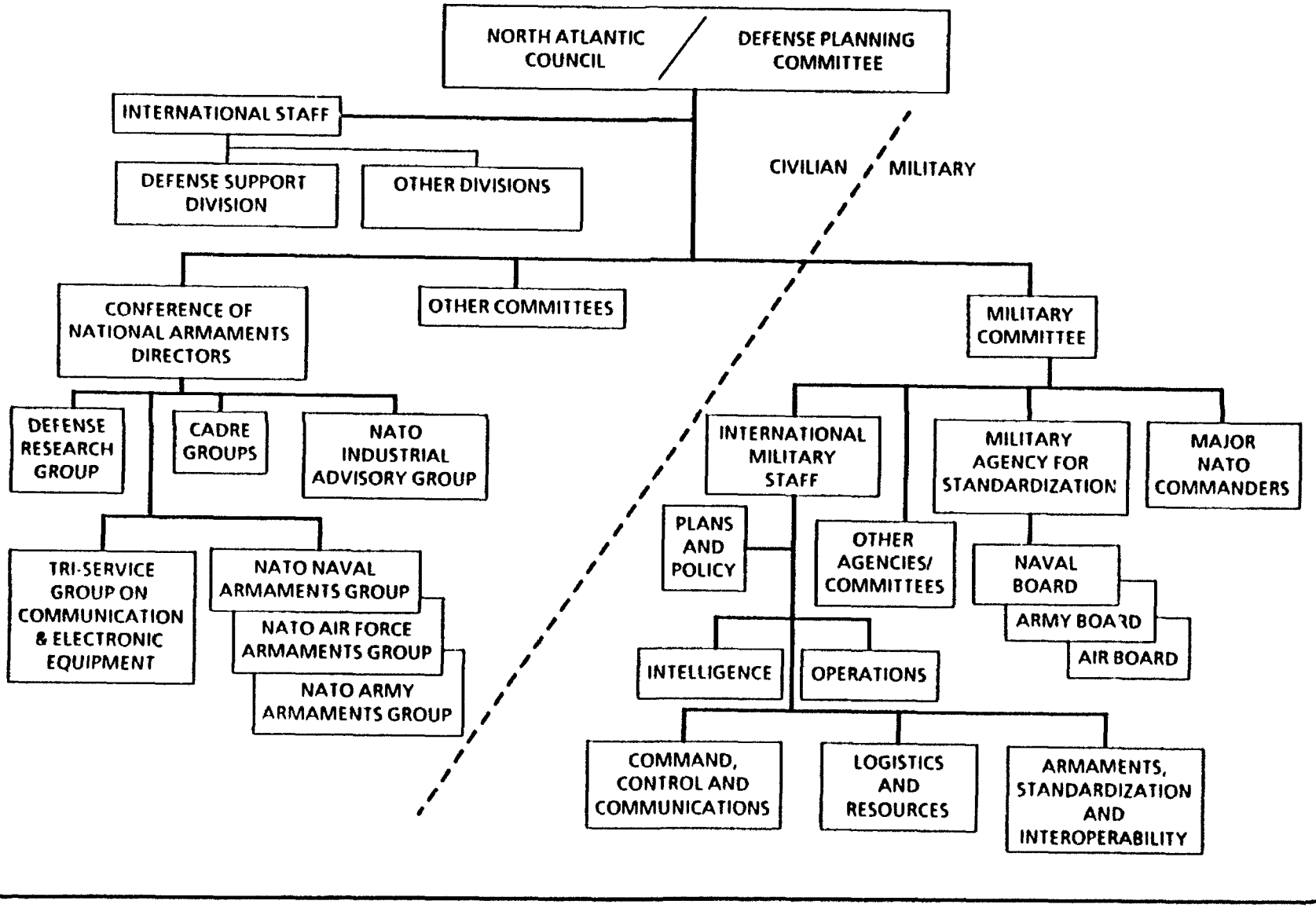
NATO OVERVIEW



NATO OVERVIEW

Our next topic is the various NATO forums. This chart is the standard NATO overview to clarify the division between civilian and military bodies in NATO and to identify the key bodies on each side that work on cooperative arrangements and standardization of materiel, doctrine, and procedures. On the civilian side, the key player is the CNAD with its subordinate Main Groups [the three Service Armaments Groups, the Tri-Service Group on Communications and Electronic Equipment (TSGCEE), the Defense Research Group (DRG), and the NATO Industrial Advisory Group (NIAG)] and the Cadre Groups – standing WGs reporting to CNAD on generic armaments cooperation issues. On the military side, the key player is the Military Agency for Standardization (MAS) with its three Service Boards. Both sides are supported by NATO staff: the International Staff (IS) on the civilian side, primarily the Defense Support Division; and the International Military Staff (IMS) on the military side, primarily the Armaments, Standardization, and Interoperability Division. Collectively, the Military Committee (MC), IMS, and Major NATO Commanders (MNCs) are referred to as the NATO Military Authorities (NMAs).

On both the civilian and military sides there are numerous committees and agencies other than the CNAD and MAS shown on the chart. For example, on the civilian side there are at least 16 other standing "principal committees" reporting to the Council; those that address materiel issues include: Senior NATO Logisticians Conference; NATO Joint Communications Electronics Committee; Infrastructure Committee; NATO Air Defense Committee; and the Command, Control, and Information Systems Committee. Similarly, on the military side, the Military Committee directs the Advisory Group for Aerospace Research and Development (AGARD), NATO Electronic Warfare Advisory Committee, the Meteorological Group, and 10 specialized multi-national command/control/communications agencies and committees.

Consequently, our focus on CNAD and MAS does not represent a comprehensive overview of NATO activities in the materiel development area. CNAD and MAS, however, do represent the principal NATO forums meeting our forum selection criteria.

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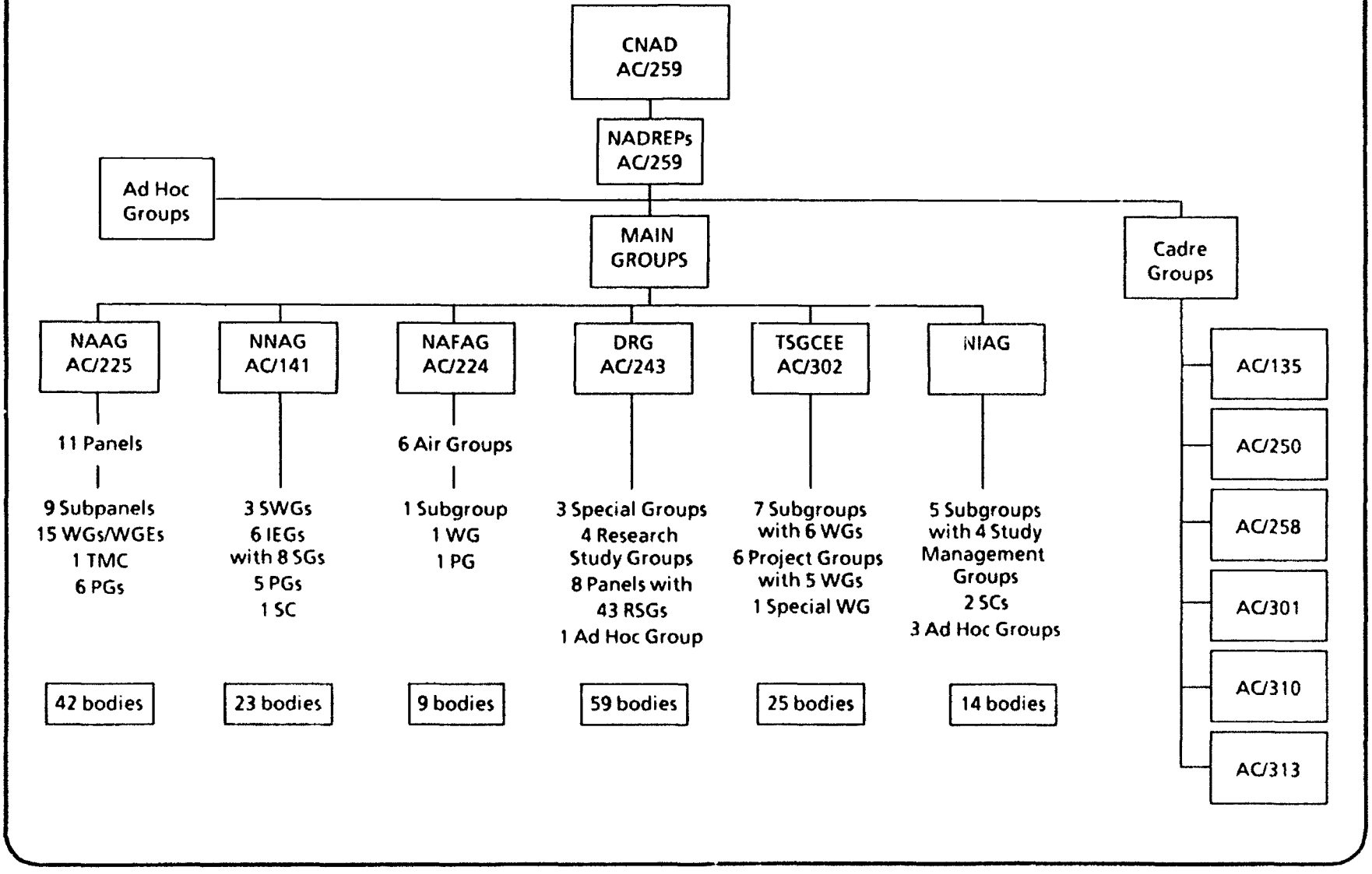
THE CNAD UNIVERSE



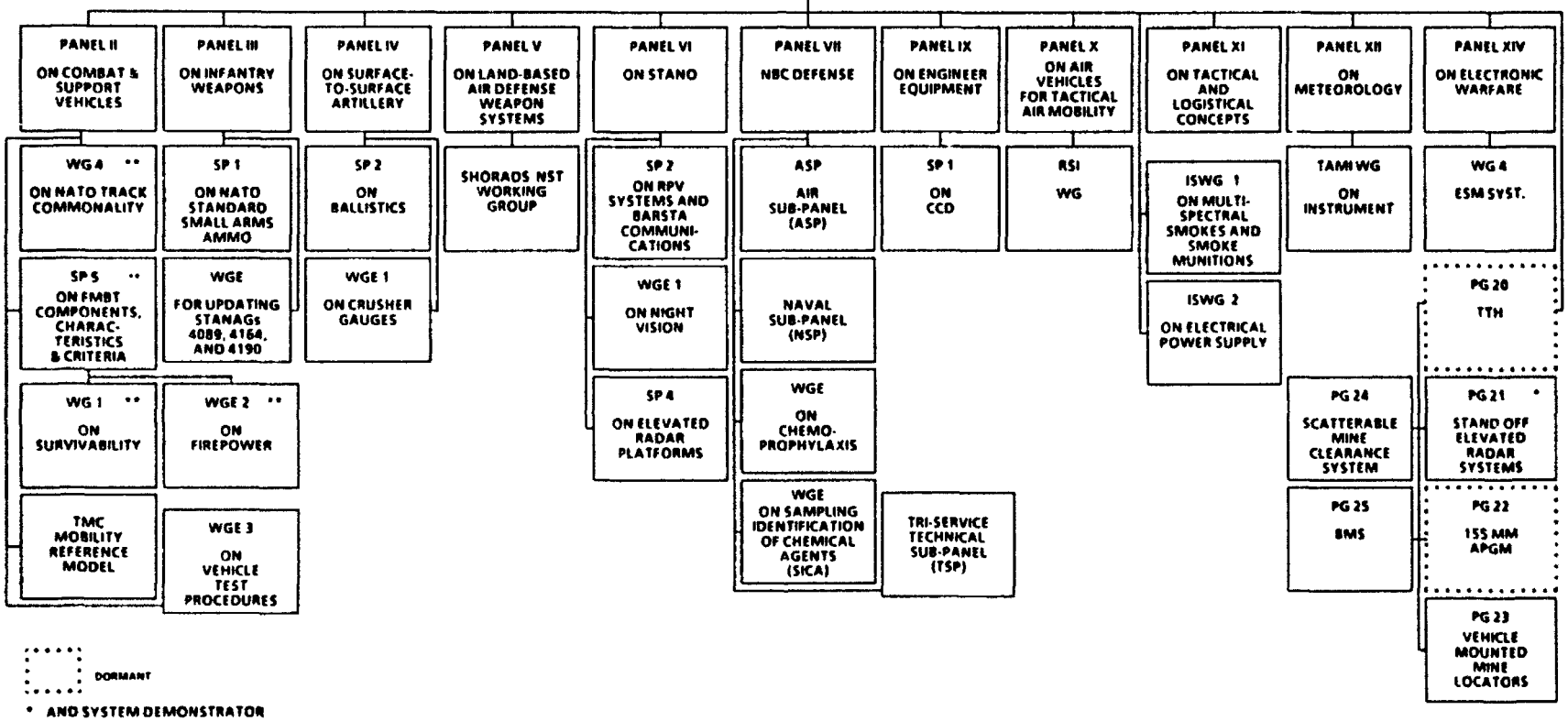
THE CNAD UNIVERSE

This chart shows the composition of the CNAD in more detail. It meets in plenary session only twice a year, so the routine day-to-day management is done by the National Armaments Directors' Representatives (NADREPs), who are members of national delegations to NATO HQ and meet on a regular basis. At both levels, CNAD and NADREPs, meetings are chaired by the NATO Assistant Secretary General (ASG) for Defense Support. Ad Hoc Groups are created from time to time to address particular issues. For example, a current Ad Hoc Group is the Multi-Service Ad Hoc Group on Follow On Forces Attack (FOFA). The Cadre Groups that are currently in existence are shown on the right-hand side of the chart. Their titles give some idea of their activities: AC/135 is the Group of National Directors on Codification; AC/250 is the Group of National Directors for Quality Assurance; AC/258 is the Group of Experts on Safety Aspects of Transportation/Storage of Ammunition and Explosives; AC/301 is the Group on Materiel (Assemblies, Components, Spare Parts, Materials) Standardization; AC/310 is the Group on Safety and Suitability for Service of Munitions and Explosives; and AC/313 is the NATO Group on Allied Acquisition Practices. These Cadre Groups have varying numbers of subordinate working groups, with a total of 55 identifiable bodies. The Main Groups are the six shown on the chart, which are composed of various levels of subordinate groups that, as of mid-1988, totaled 173 identifiable bodies. The total CNAD universe thus encompasses approx.mately 230 bodies. One body not shown separately on the chart is the NATO Conventional Armaments Review Committee (NCARC) that was established in 1988 to oversee the Conventional Armaments Planning System (CAPS) in parallel with the force planning process that is overseen by the Defense Review Committee, which reports to the Council. The NCARC, originally conceived as a higher level body reporting to the Council, actually has become an additional function of the NADREPs.

Our survey focused on the NAAG and the DRG.

NATO ARMY ARMAMENTS GROUP (NAAG)

As of January 1988



DORMANT

* AND SYSTEM DEMONSTRATOR

** WILL BE DISBANDED DURING 1988

APGM Autonomous Precision Guided Munitions
BARSTA Battlefield Radars Surveillance Target Acquisition
BMS Battlefield Management System
CCD Camouflage, Concealment, and Deception
ESM Electronic Security Measures
FMBT Future Main Battle Tank
ISWG Independent Special WG
NST NATO Staff Target
PG Project Group
RPV Remotely Piloted Vehicle
RSI Rationalization, Standardization, and Interoperability
SHORADS Short-Range Air Defense Weapon System
SP Sub-Panel
STANO Surveillance, Target Acquisition and Night Observation
TAMI Target/Silent Area Meteorological Instrumentation
TMC Technical Management Committee
TTH Tactical Transport Helicopter
WG Working Group
WGE Working Group of Experts

NATO ARMY ARMAMENTS GROUP (NAAG)

This chart displays the NAAG organization as of early 1988. It has 11 panels and a number of Project Groups (PGs). As the chart shows, each panel has a variety of subordinate groups that fall into the following categories: subpanels (SP), working groups (WG) or working groups of experts (WGE), technical management committees (TMCs), and independent special working groups (ISWGs). The fine distinctions among these categories are not always clear, except that ISWGs report directly to the NAAG, not to a panel or subpanel like the other groups. Project Groups are groups of two or more countries that have agreed on a cooperative project; those groups therefore have a specific membership and once they have progressed to a stage where the project is governed by an MOU and managed by an international program steering committee, then the PG becomes "dormant" and is ultimately disbanded.

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U.S. HoDs TO NAAG PANELS

- Pre-1986: DCSRDA staff
- DA Reorganization: DCSRDA staff – OASA(RD&A)
- LTG Pihl (SARD-ZB) decision, 1987: HoDs should be PEO LOs to SARD

Panel	Name	U.S. Head of Delegation			Liaison to PEO
		Agency	Office Code	Rank	
II	Combat and Support Vehicles	HQDA	SARD-SM	O-4	No
III	Infantry Weapons	ARDEC (Chief, Joint Service	SMCAR-CEG Small Arms Program	SES Office)	N/A
IV	S-S Artillery	HQDA	SARD-SM	O-4	PEO Fire Support
V	Land-Based Air Defense Weapons	HQDA	SARD-SF	O-4	PEO Air Defense
VI*	Surveillance, Target Acquisition, and Night Observation	AMC	AMC-PEO-IEW	Civ	PEO IEW
VII	NBC Defense	USANCA	MONA-?	SES	N/A
IX	Engineer Equipment	AMC	AMC-AM-AM	O-5	PEO Combat Armaments Systems
X	Air Vehicles for Tactical Mobility	HQDA	SARD-SC	O-5	PEO Army Aviation
XI**	Tactical & Logistics Concepts	TRADOC	ATDO-J	O-5	N/A
XII***	Meteorology	AMC/LABCOM	ASL-?	SES	N/A
XIV*	Electronic Warfare	HQDA	SARD-SI	O-4	PEO IEW

* To be combined into 1 panel under current reorganization proposal

** To be phased out in 1990 (after completion of its 13 concepts) if LTPGs from SHAPE/IMS adequate

*** Not a CMF functional area, hence to be downgraded to an ISWG

U.S. HoDs TO NAAG PANELS

This chart shows the U.S. HoDs to the 11 NAAG panels by agency and office. Until 1986, the U.S. HoD was normally someone from the Office of the Deputy Chief of Staff for Research, Development and Acquisition (DCSRDA). With the HQDA reorganization in 1986 pursuant to the Packard Commission, whereby DCSRDA was merged into the Army Secretariat, the HoDs initially remained the same individuals with a different label. In 1987, LTG Pihl decided this was not the best arrangement and stated that, as policy, the U.S. HoDs should be the Liaison Officers (LOs) of the Program Executive Officers (PEOs) at the Office of the Assistant Secretary of the Army for Research, Development and Acquisition [ASA(RDA)]. Since that time, some changes have occurred, and the chart displays the current situation, which is influenced as much by personalities as by policy. Thus, for four panels (IV, V, X, and XIV) the situation reflects policy. For other panels, the U.S. HoD is either in SARD, but not a PEO LO (e.g., Panel II), or a representative of a PEO or PM but not located in SARD (e.g., Panels III, VI, VII, and IX – both VII and IX used to be in SARD but were transferred), or the situation reflects a longstanding arrangement, such as Panel XI and Panel XII (in the case of Panel XII, the U.S. HoD is the same person at a scientific laboratory in White Sands as 20 years ago). In all cases, SARD-IN, as the Army functional agent for NATO activities, picks or approves the U.S. HoD. The U.S. HoD at the NAAG level is the Deputy for International Cooperation, OASA(RDA), (SARD-IN).

In its January 1988 meeting, the NAAG discussed various ways to rationalize the organizational structure and accepted a U.S. offer to present a paper on this topic at the June 1988 meeting. Some of the ideas in the U.S. paper presented by LTC Jay Johnson of SARD-IN did not find agreement, e.g., the U.S. proposal to combine Panels II and III into one panel, re-named Close Combat. Other ideas were well-received, e.g., the notion of linking NAAG closer to the Conceptual Military Framework (CMF). The CMF is the NATO Military Authorities' (NMA) long-term planning document, which was approved in the December 1985 meeting of the Defense Planning Committee (DPC) as the basis for force planning. The DPC CMF was subsequently supplemented with the Supreme Allied Commander, Europe's (SACEUR) CMF, which provides a prioritized statement of both qualitative and quantitative requirements in a matrix of 25 functional areas and 8 key mission components. The revised U.S. proposal, as briefed by LTC Johnson in October 1988 to MG Beltson, is as indicated by the asterisks on the chart, namely: to combine Panels VI and XIV into one, to phase out Panel XI because it does not belong in CNAD, and to downgrade Panel XII to an ISWG because it is not a functional area in the CMF or, alternatively, to make it a subpanel under Panel IV. The proposal is to reduce the number of subgroups in NAAG and elsewhere in CNAD because the current structure has became unmanageable.

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CNAD/NAAG CHARTER AND PROCEDURES

CNAD:

- Created in 1966 to replace Armaments Committee (1958), which replaced Defense Production Committee (1954)
- Abolished NBMR procedure (Document C-M(59)82, November 1959); 49 NBMRs = 0 results
- Charter (Document C-M(66)33, 1966) sets a more flexible approach to cooperation in research, development, and production of military equipment, based on following principles:
  - Each nation is responsible for equipping its own forces, whether or not NATO-assigned
  - Cooperation based on national or NMA proposals, not on formal NBMRs; is indispensable for smaller countries; must be permissive in that any country free to join cooperative project (i.e., NATO supports, but does not regulate, cooperation in R&D and production)
  - NMAs provide advice, do not make decisions
  - Sharing of technical/economic benefits from cooperative programs in proportion to national contributions
  - Nations encouraged to present national military requirements and procurement plans
  - Consultations on operational concepts and information exchange on specific national projects to continue.

NAAG TOR:

- Chair is National Rep (elected every 2 years); Vice-chair is Director, Armaments & Defense Research (Defense Support Division)
- Meetings attended by reps of NMAs
- Responsibilities:
  (1) Exchange information on national concepts, equipment programs, R&D programs
  (2) *Identify areas or individual proposals for bilateral/multilateral cooperation resulting from IEX*
  (3) Establish subordinate bodies as needed to implement cooperative projects and report to CNAD those for which 2 or more countries are sufficiently committed to set up NATO Project Steering Committee
  (4) Coordinate with NNAG, NAFAG, and DRG to avoid duplication

NAAG Panel TORs:

- Composition: Chair, Secretary, National Delegations, Representatives of other bodies as appropriate
- Aims: (1) Identify and develop cooperative projects
  (2) Develop STANAGs and other NATO documents supporting interoperability
  (3) Exchange of information that can lead to (1) or (2)

CNAD/NAAG CHARTER AND PROCEDURES

This chart summarizes the charter and procedures of CNAD as well as NAAG. CNAD is the 1966 successor to the Armaments Committee that was established in 1958 to promote cooperation in R&D as well as in production. Prior to 1958, the scope of NATO cooperation excluded R&D. The procedure that was established in 1959, the NATO Basic Military Requirement (NBMR), turned out to be unsuccessful. Between 1959 and 1966, the NMAs had produced 49 NBMRs, but not a single cooperative R&D project had been undertaken to meet those requirements. The philosophy adopted with the establishment of CNAD was to make the process for cooperation more flexible and to downgrade the role of the NMAs. The key principles on which the CNAD charter is based are listed here: essentially they view NATO as a facilitator, not a regulator, of armaments cooperation.

All of the bodies subordinate to CNAD have TOR that are approved by the sponsoring echelon (i.e., CNAD approves the TOR of the Main Groups and Cadre Groups; NAAG approves the TOR of all its subordinate bodies, except that the establishment and TOR of a Project Group must be approved by CNAD). The TOR of the NAAG defines its responsibility as information exchange, identification of cooperative candidates resulting therefrom, establishment of any subordinate bodies to pursue such cooperative efforts, and coordination with the other Main Groups to avoid duplication.

Each panel has its own TOR and, in the details, they tend to be somewhat different. They can be characterized, however, by the aims stated at the bottom of the chart in three priorities: cooperative projects, Standardization Agreements (STANAGs), and information exchange. Evaluation of their productivity or effectiveness should be in terms of these three goals.

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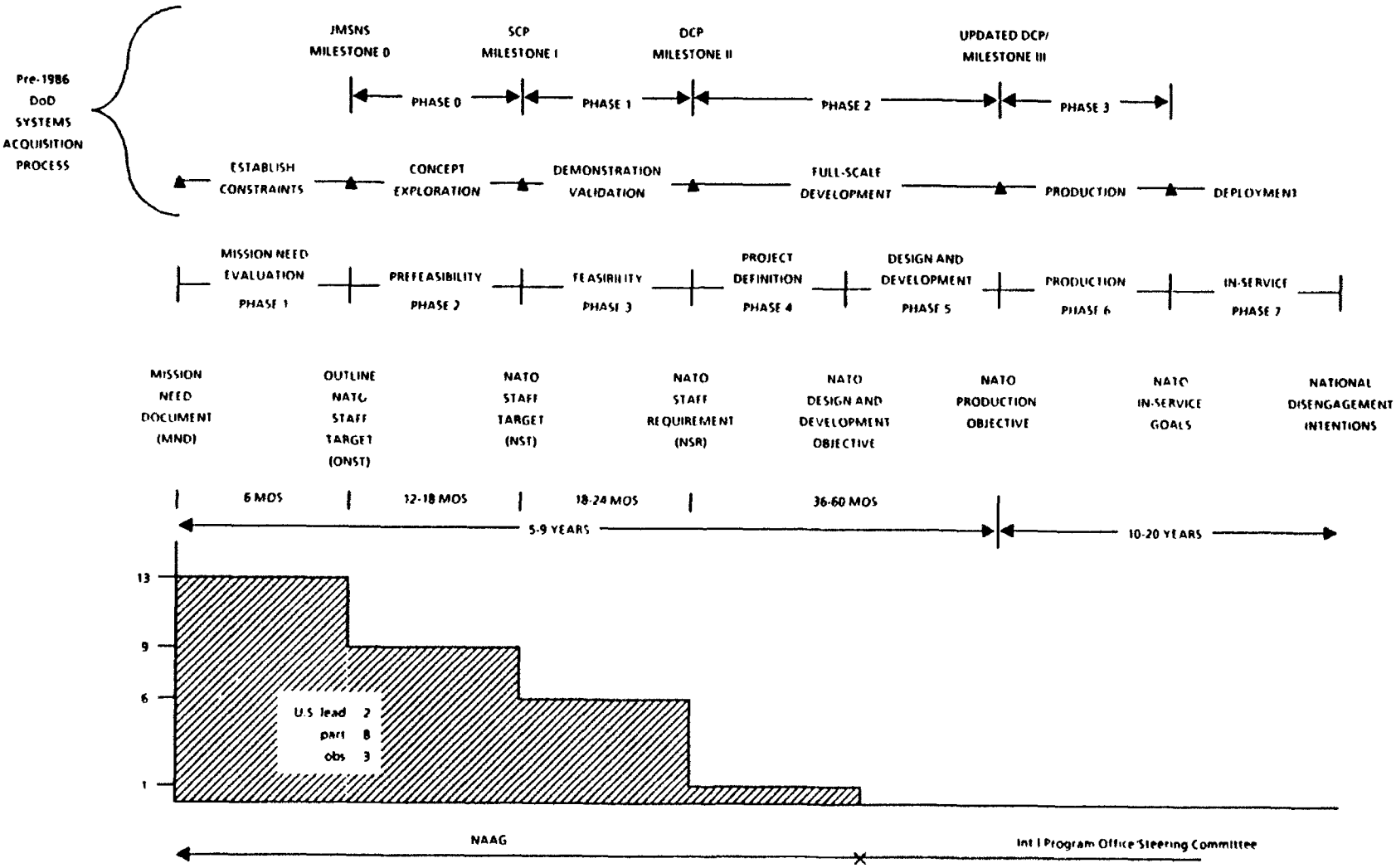
NATO PHASED ARMAMENTS PROGRAMMING SYSTEM (PAPS)



Profile of Active NAAG Projects (Cumulative as of mid-1988)

NATO PHASED ARMAMENTS PROGRAMMING SYSTEM (PAPS)

Arms cooperation in NATO is tied to the Phased Armaments Programming System (PAPS). In its current version it is the 1984 replacement of the old Periodic Armaments Planning System, which was approved by CNAD for implementation in 1981 as a management tool for arms cooperation. The new PAPS is a more formalized mechanism than the old one with the identical objective: foster cooperative programs on meeting national requirements and monitor progress in meeting NATO materiel requirements. The chart compares PAPS with the U.S. weapon system acquisition process pre-1986. The U.S. process now includes a fourth and fifth milestone in the weapon system life cycle, which are not shown on the chart. The chart serves to emphasize the context of the NATO PAPS milestones in the development process: the Mission Need Document (MND) is a very early document in the Mission Area Analysis (MAA) stage in the United States; the Outline NATO Staff Target (ONST) is comparable to a Justification for Major System New Start (JMSNS), which with the DoD Instruction 5000.2 of September 1987 has been renamed Mission Need Statement (MNS); the NATO Staff Target (NST) is comparable to the Milestone I System Concept Paper (SCP); and the NATO Staff Requirement (NSR) is comparable to the Milestone II Decision Coordinating Paper (DCP), which signals readiness to proceed to full-scale development.

A profile of the current active cooperative projects in NAAG is displayed at the bottom of the chart. Of the 13 projects, 6 have a final agreed NST, but only 1 of those has completed the feasibility phase and proceeded to a draft NSR. Once nations commit themselves to cooperative development, they prepare an MOU and the project comes under the aegis of an International Program Office while the PG in NAAG becomes dormant (i.e., NAAG is not normally involved in the management of those MOU projects).

FINDINGS ON NAAG PANEL ACTIVITIES AND RESULTS

- Survey Forms (PII and PIII only).
- Past success rate of projects at NST milestone is <50%; apparently, many projects were started without serious national commitments (i.e., rather as vehicle for information exchange).
- Not a single NAAG project has been fielded to date.
- Total number of STANAGs under NAAG sponsorship stable at ~50.
- CNAD (1987) directed 30% cut in subordinate bodies; NAAG restructuring under study.
- Some terminated NAAG projects continued outside NATO.
- More historical data required to get a better assessment of results.

FINDINGS ON NAAG PANEL ACTIVITIES AND RESULTS

Due to the massive documentation on the activities of the NAAG panels, we completed only two survey forms, those for Panel II (Combat Vehicles) and Panel III (Infantry). The forms in the appendix summarize the activities of those two panels for the last five years. Panel II has been trying to proceed from a signed MND for the Future Main Battle Tank but has been unable to make much progress beyond the ONST. Though a Pre-Feasibility Study (PFS) was conducted by the NATO Industrial Advisory Group, participating nations have not agreed on an NST at the tank system level. Currently they are working on possible cooperative projects at the subsystem level, and the Battlefield Management System is one of the identified candidates, but no NST or NSR has so far resulted from that effort. The Future Infantry Combat Vehicle (FICV) was canceled in 1986. Panel III shows a similar lack of achievements: in the past five years it has produced two ONSTs; one was canceled with the cancellation of FICV; the other one has stalled at the ONST stage.

The summary chart suggests that in the past many projects were started in NAAG without serious commitments by participating nations. In 1985, CNAD conducted a study of the reasons why a large number of PAPS activities failed to mature into cooperative projects. It found that in the period 1981-1985, the first five years of PAPS, about 50% of the projects were terminated or at risk and the two dominant reasons were either the lack of a cooperative objective (i.e., nations sought to use requirements documents such as the MND and ONST as vehicles for information exchange rather than as the first step in a concrete program for cooperative R&D) or the pursuit of bi- or multilateral agreements outside CNAD (i.e., alternative national plans were well advanced even though national representatives continued to pursue cooperation under CNAD, causing misleading and wasteful duplication of efforts).

Not a single NAAG project in which the United States has participated has been fielded to date, but there are some promising projects in the pipeline, specifically the Autonomous Precision Guided Munition. The total number of STANAGs sponsored by NAAG has remained constant at approximately 50 for the past 10 years. There are some indications that the STANAG work is not done very well in a few of the panels, and the NAAG Audit Group, which annually reviews the activities and effectiveness of NAAG panels, recently concluded that STANAGs tend to be neglected in NAAG panels.

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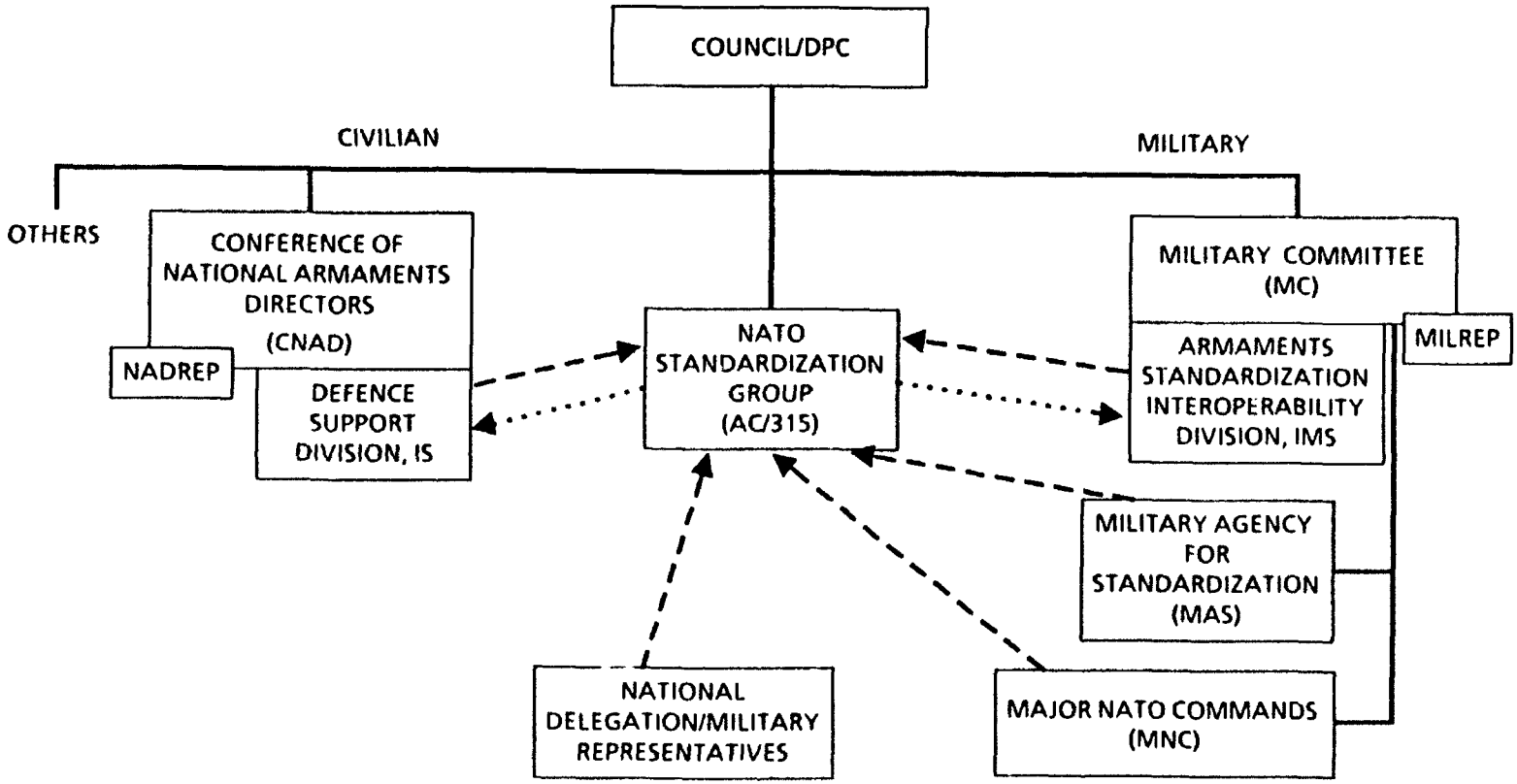
NATO ORGANIZATIONS RESPONSIBLE FOR STANDARDIZATION



ORGANIZATIONAL ——————

STANDARDIZATION COORD - - - - - - -

IMPLEMENTATION . . . . . .

- AC/315 established June 1985 to coordinate standardization efforts throughout NATO: "NATO Standardization Program"
- Group also developing computerized database to help determine gaps and overlaps in standardization activities

NATO ORGANIZATIONS RESPONSIBLE FOR STANDARDIZATION

Standardization has been a long-sought but elusive goal in NATO. Many observers argue that a principal cause of the military capability gap between NATO and the Warsaw Pact is NATO's failure to achieve adequate standardization. This chart displays the NATO organizations responsible for standardization. Until recently there was little NATO-wide coordination of standardization efforts, with numerous activities formulating their own programs and priorities. In April 1979, a working group on rationalization, standardization, and interoperability (RSI) was established by the North Atlantic Council (NAC) to develop a mechanism for better coordination and to establish "principles of NATO standardization." The WG completed its report in 1982, and one of the results was the establishment of the NATO Standardization Group (AC/315) as the main body responsible for coordinating standardization efforts between the civilian and military sides of NATO and for establishing a database of standardization programs and activities. The main agency on the military side responsible for standardization is the MAS. The next few charts describe the activities and accomplishments of the MAS, particularly the Army Board of the MAS.

MAS STANDARDIZATION PROGRAM

POLICY (MC 20/8, 1984)

- Aim: Increase combined military effectiveness
- Principles: Standardization is voluntary but essential if OPLAN depends on it
- Responsibilities:
  - MC - military requirements and views
  - MNCs - objectives and priorities; STANAG effectiveness reports (but . . .)
  - IMS - staff support, incl. development/assessment of related activities (e.g., operational concepts, MNDs, military input to NAPR)
  - MAS - key agent for standardization (TOR)
- Standards:
  - Operational (concepts, doctrine, tactics, techniques, logistics, training, organizations, forms, maps)
  - Materiel - CNAD: application of technical means/standards for future equipment development
    - MAS: production codes, materiel specifications (system/subsystem/parts and consumables)
  - Administrative

ORGANIZATION

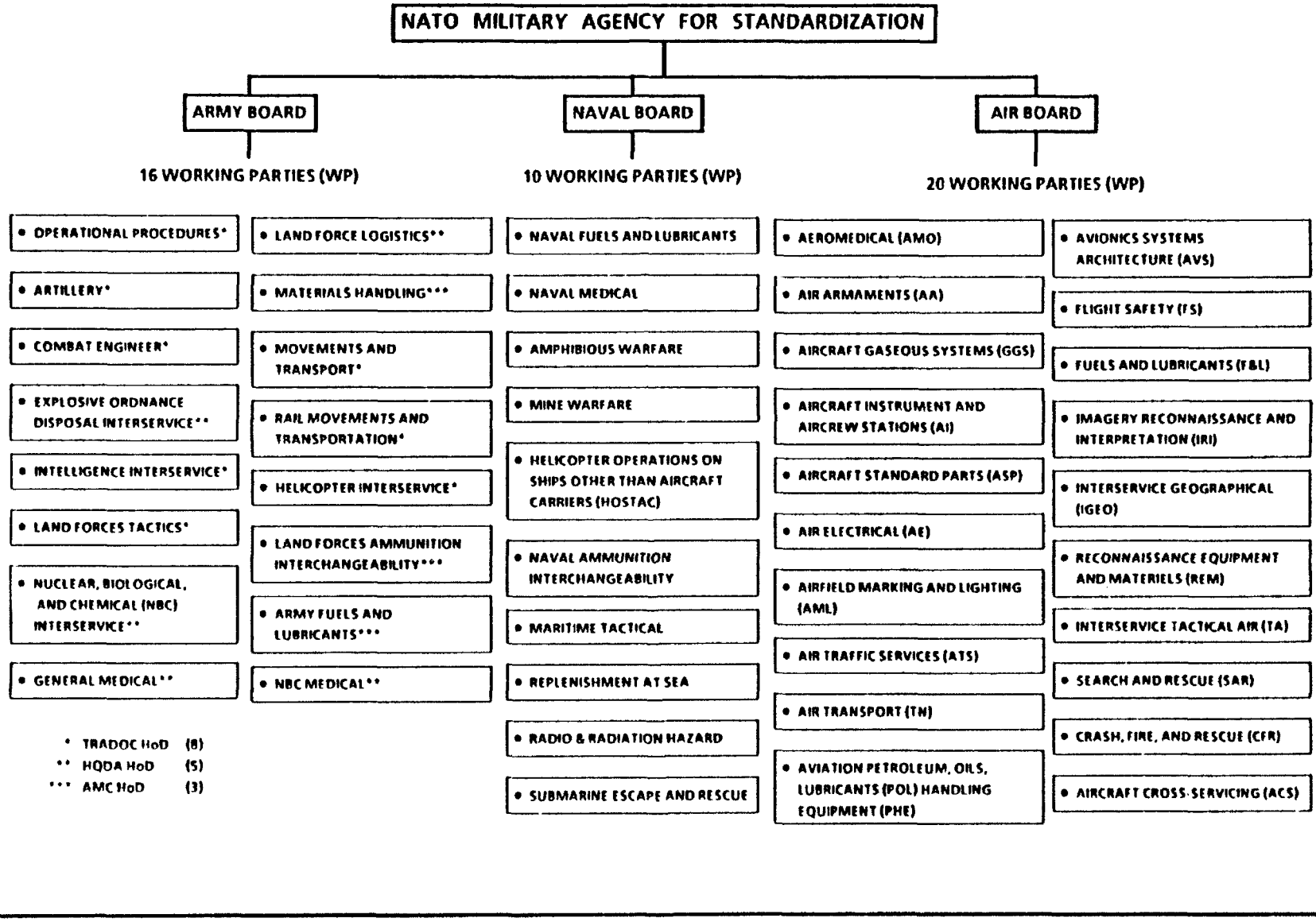
- Chairman, MAS (CMAS) - figurehead
- Service Boards and Committees- independent; international chair (O-6), permanent members (14 national delegates), MNC reps; permanent session/monthly meetings, TOR
- Coordinating Committee
- Working Parties and Panels - TOR: standardization studies, proposals; development/review of STANAGs/APs.

MAS STANDARDIZATION PROGRAM

Pursuant to the RSI WG (AC/308) recommendations, the policy document of the MAS, MC 20/7, was revised in 1984 to account for the stated "principles of NATO Standardization," the formation of AC/315, and NATO IS and IMS responsibilities. The resulting document, MC 20/8, is summarized on this chart. It states that the guiding principle is that standardization is voluntary and not an end in itself. It is essential when the implementation of Operational Plans (OPLANs) depends on it, and is desirable when implementation of OPLANs or NATO economy is enhanced. Maximum operational standardization must be achieved NATO-wide but is subject to conflicting requirements because of national sovereignty. It states the responsibilities as follows: the Military Committee provides military requirements and views on all standardization matters, directs the NATO terminology program, and directs the application of Principles of NATO Standardization, C-M (82) 26, April 1982; the MNCs establish standardization objectives and priorities, report systematically on the effectiveness of STANAGs, and provide representation to standardization tasking authorities and working groups [In spite of this directive, however, the MNCs have so far neglected to evaluate STANAGs in combined field exercises.]; the IMS provides staff support for armaments and standardization matters including development or assessment of related activities such as tactical concepts, MNDs as input to PAPS, and military input to the annual NATO Armaments Program Review (NAPR); and the MAS is designated as the principal MC agency concerned with standardization. The TOR for the MAS, the MAS chairman, and the MAS Service Boards are included in this MC document.

NATO standards are divided in three categories: operational, materiel, and administrative. Materiel standards can be the responsibility either of CNAD or MAS depending on the content.

The MAS organization consists of a chairman, three Service Boards, which are largely independent bodies, a Coordinating Committee, and Working Parties or Panels subordinate to each Service Board. All of these bodies have the same TOR. The WPs, in accordance with the TOR, are responsible for standardization studies, generation or review of standardization proposals, and development or review of STANAGs and allied publications (APs). The current structure of the MAS is displayed on the next chart.


NATO MILITARY AGENCY FOR STANDARDIZATION
ARMY BOARD
NAVAL BOARD
AIR BOARD
16 WORKING PARTIES (WP)
10 WORKING PARTIES (WP)
20 WORKING PARTIES (WP)
• OPERATIONAL PROCEDURES*
• ARTILLERY*
• COMBAT ENGINEER*
• EXPLOSIVE ORDNANCE DISPOSAL INTERSERVICE**
• INTELLIGENCE INTERSERVICE*
• LAND FORCES TACTICS*
• NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) INTERSERVICE**
• GENERAL MEDICAL**
• LAND FORCE LOGISTICS**
• MATERIALS HANDLING***
• MOVEMENTS AND TRANSPORT*
• RAIL MOVEMENTS AND TRANSPORTATION*
• HELICOPTER INTERSERVICE*
• LAND FORCES AMMUNITION INTERCHANGEABILITY***
• ARMY FUELS AND LUBRICANTS***
• NBC MEDICAL**
• NAVAL FUELS AND LUBRICANTS
• NAVAL MEDICAL
• AMPHIBIOUS WARFARE
• MINE WARFARE
• HELICOPTER OPERATIONS ON SHIPS OTHER THAN AIRCRAFT CARRIERS (HOSTAC)
• NAVAL AMMUNITION INTERCHANGEABILITY
• MARITIME TACTICAL
• REPLENISHMENT AT SEA
• RADIO & RADIATION HAZARD
• SUBMARINE ESCAPE AND RESCUE
• AEROMEDICAL (AMO)
• AIR ARMAMENTS (AA)
• AIRCRAFT GASEOUS SYSTEMS (GGS)
• AIRCRAFT INSTRUMENT AND AIRCREW STATIONS (AI)
• AIRCRAFT STANDARD PARTS (ASP)
• AIR ELECTRICAL (AE)
• AIRFIELD MARKING AND LIGHTING (AML)
• AIR TRAFFIC SERVICES (ATS)
• AIR TRANSPORT (TN)
• AVIATION PETROLEUM, OILS, LUBRICANTS (POL) HANDLING EQUIPMENT (PHE)
• AVIONICS SYSTEMS ARCHITECTURE (AVS)
• FLIGHT SAFETY (FS)
• FUELS AND LUBRICANTS (F&L)
• IMAGERY RECONNAISSANCE AND INTERPRETATION (IRI)
• INTERSERVICE GEOGRAPHICAL (IGEO)
• RECONNAISSANCE EQUIPMENT AND MATERIELS (REM)
• INTERSERVICE TACTICAL AIR (TA)
• SEARCH AND RESCUE (SAR)
• CRASH, FIRE, AND RESCUE (CFR)
• AIRCRAFT CROSS-SERVICING (ACS)
* TRADOC HoD (8)
** HQDA HoD (5)
*** AMC HoD (3)

NATO MILITARY AGENCY FOR STANDARDIZATION

The Army Board has 16 Working Parties. The distribution of U.S. HoDs to these WPs is shown at the bottom: 8 HoDs come from TRADOC, 5 from HQDA, and 3 from AMC.

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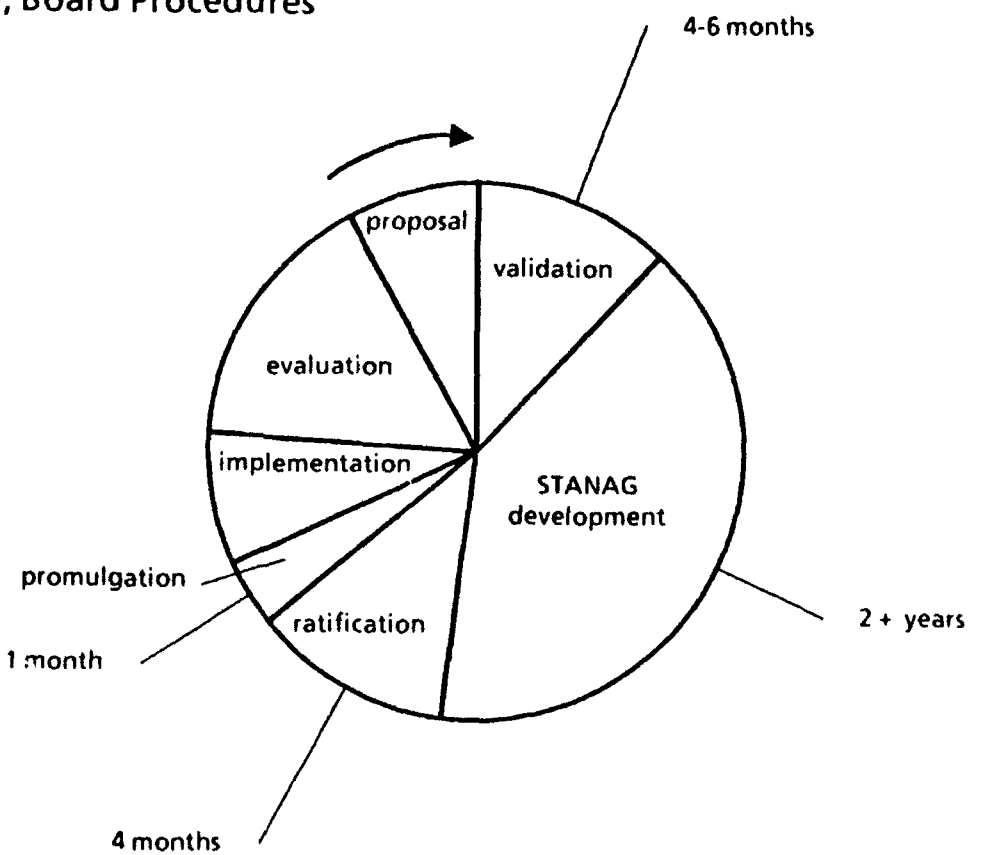
MAS STANDARDIZATION PROCESS

PROCEDURES

- AAP-3, MASAI, Board Procedures



MAS STANDARDIZATION PROCESS

The general process for the life cycle of STANAGs is documented in AAP-3, MAS Administrative Instruction (MASAI), and supplementary Service Board procedures. Proposals may be submitted by any NATO nation, command, agency, or working group to the MAS Chairman or chairman of a MAS Service Board. If it is related to more than one Service, the proposal will be tabled at the MAS Coordinating Committee to decide which Service Board should process it. The Army Board meets monthly and proposals are distributed to Board members by the Secretariat two months before the proposal appears on the agenda. The Board's initial examination determines whether the proposal is accepted or rejected. If accepted, the proposal enters the so-called validation phase, in which it is forwarded to nations, commands, and other interested agencies for response by a specific date (usually four months). Recipients provide "validation responses," indicating whether they see a need for the proposal, whether they will participate in its development, whether they volunteer to become a custodian, and what priority the effort should receive. The Army Board compiles the responses and, depending on the extent of national interest and the nature of the proposal, may reject the proposal, refer it to a WP for further work and resubmission, or assign it as a task to the appropriate WP or custodian. Development of a STANAG typically takes 2 years (ranging from a low of 6 months to a maximum of 10 years).

When the draft is ready for ratification by nations, the Army Board reviews the draft: it may again cancel the whole thing, return it for revision, or approve it for ratification. In the latter case the draft STANAG is forwarded to nations with a ratification response requested normally within four months. If ratification results justify promulgation, the Board forwards the STANAG to the MAS Chairman who formally approves promulgation. Evaluation refers to two distinct procedures. One is the biennial review of STANAGs and APs conducted by the cognizant WPs to confirm that the documents are up to date and to develop recommendations for amendments or new editions to improve ratification by nations or reduce national reservations. The second process, instituted in 1987, is the development of questionnaires to support the MNCs in their task of evaluating the effectiveness of STANAGs. The current TOR make WPs responsible for preparing questionnaires for procedural standards to enable interested nations and MNCs to evaluate during exercises whether the content of a STANAG or AP is useful, practical, and improves the effectiveness of combined forces. The procedure adopted by the Army Board is to collect the questionnaires developed by WPs in a folder that is reviewed annually by the Board. Nations and MNCs are to announce annually which questionnaires they intend to use on next year's exercise and to report results to the Army Board. The Army Board may form observer teams to participate in exercises and support the evaluation process, and all evaluation results, whether from MNCs, national commands, or observer teams, are fed back to the cognizant WP. This procedure is relatively new and we have not seen any evaluations of it.

FINDINGS ON ARTY WP ACTIVITIES AND RESULTS

- No survey form prepared (limited information in file: 1985 & 1987 annual reports, trip report for 1986).
- No evidence Arty WP involved in materiel-related R&D.
- Responsible for 14 STANAGs and 2 APs.
- Work focused on:
  - maintaining STANAGs
  - reviewing proposals for new areas of standardization
  - preparing questionnaries for STANAG evaluation
  - some national presentations.
- Procedure for evaluation of STANAGs through SHAPE still under review by Army Board, MAS, and MC.
- The only function Army Board WPs have regarding materiel development is a new task in the TORs since 1985:

  "[to] request a pilot nation or Command to provide the CNAD and MC with an MND where standardization of procedures requires a change to existing or the development of a new item of equipment, and inform the Board."
- The TAC DOC WP does not affect materiel development because by TOR its responsibility is doctrine, not operational concepts:
  - "NATO operational concepts" is exclusive domain of MNCs and MC
  - Concepts developed by NAAG Panel XI are only in support of materiel development and not recognized as "NATO operational concepts"
  - U.S. Army proposal to create joint service body under MC responsible for operational doctrine is not making headway.

FINDINGS ON ARTY WP ACTIVITIES AND RESULTS

We reviewed the minutes of meetings of the Artillery WP, but did not prepare a survey form: the information available in AMCICP's files is limited but the Artillery WP has not involved itself in efforts related to cooperative R&D. Its activities are summarized on this chart. In the materiel development arena, its only responsibility is the identification of materiel requirements needed to standardize procedures – a task introduced in its 1985 TOR revision as quoted further down on the chart. The last notation refers to the division of responsibility established between the MC, the MAS, and the NAAG in the operational concept and doctrine areas. If harmonization of operational concepts must precede armaments cooperation, there are some problems in NATO's structural relationships: NAAG Panel X I's activities in support of materiel development efforts result in "operational concepts" that are not recognized as "NATO operational concepts," which are the exclusive domain of the MC. The MAS Tactics and Doctrine WP works on harmonization of national doctrines only in tactics and logistics – its authority does not extend to future operational concepts, nor does NATO currently possess an operational-level combined/joint doctrine. This situation is fraught with potential conflicts. Since early 1988, a new procedure has been introduced whereby NAAG's operational concepts are forwarded to the MNCs (via CNAD and MC) for their consideration and comment. As of mid-1988, no MNC comments had been received.

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APPRAISAL OF MAS EFFECTIVENESS

- Standardization Requirements
  - Effective organization to deal with topics already covered by existing WPs
  - Inflexible/unresponsive when new requirements surface (e.g., BDAR)
- Standardization Agreements
  - MAS procedures effective in generating agreements, see "D104" database:

Army – 212)
Navy – 169)
AF – 348)

Agency	STANAGs Total	USA ratified	TRADOC	AMC	Other
MAS	729	565	265	254	1
CNAD	152	64	13	51	–
IMS	35	25	16	0	–
Total	916	654	294	305	1

- Currency/Effectiveness of Agreements
  - Without user feedback (MNCs, joint exercises), cannot assess effectiveness of STANAGs
  - Recent Army Board initiative to produce questionnaires to solicit feedback
  - Biennial reviews cannot ensure agreements are current with interoperability needs
- National Implementation
  - Agreement document itself stresses implementation by ratifying nations
  - NATO lacks any formal mechanism for monitoring or assessing degree of actual implementation
  - Emphasis on NDI acquisition presents potential conflicts with ratified STANAGs

APPRAISAL OF MAS EFFECTIVENESS

An appraisal of MAS effectiveness can be based on four criteria. It is an effective organization for addressing standardization requirements that fit in the established organizational structure of functional WPs, but somewhat unresponsive when they do not. For example, in battle damage assessment and repair (BDAR), the MAS Army Board has made only limited progress. It generates many STANAGs as the table on the chart shows, but in the last two criteria MAS effectiveness is doubtful: without user feedback there is no assurance that the STANAGs make a real contribution to increased combat effectiveness and, without a formal mechanism for monitoring or assessing the degree of national implementation as opposed to ratification, there is some question as to how well NATO can ensure implementation. Furthermore, the trend in the United States and other nations toward acquisition of nondevelopmental items (NDI) clearly presents potential problems in terms of complying with STANAGs ratified in the past.

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INTERNATIONAL TECHNOLOGY R&D COOPERATION

- Institutional Forums:
  - NATO DRG
  - The Technical Cooperation Program (TTCP)
- Similarities of both forums:
  - Not integrated with U.S. R&D missions and investment decisions
  - No U.S. DoD goals/objectives
  - No visibility or fencing of U.S. R&D funds
  - Little coordination and oversight; no database
  - No mechanism for prioritizing/selecting R&D efforts
  - No mechanism for "mining" R&D results to transition to development
- Growing recognition United States must do better:
  - DSB 1987 Summer Study "Technical Base Management"
  - OSD Working Group (IPT, R&AT)
  - IDA Report "Evaluation of International Technology Base Programs," 1988

INTERNATIONAL TECHNOLOGY R&D COOPERATION

We will now briefly examine two cooperative, non-systems research forums. These are the NATO Defense Research Group (DRG) and the Technical Cooperation Program (TTCP). They have a number of similarities to each other: they are essentially outside and independent of the U.S. DoD R&D program, there are no formal U.S. goals, there is no visibility or fencing of R&D funds, no database on what goes on, no mechanism for prioritizing efforts, and no mechanism to ensure that R&D results find application in weapon system development programs. These longstanding deficiencies are now recognized, as the last three items on the chart suggest.

U.S. INITIATIVES IN INTERNATIONAL TECHNOLOGY COOPERATION

- ET Initiative:
  - Secretary of Defense Weinberger to 1982 DPC Meetings
  - Thrust: intensify cooperative development/application of advanced technology to enhance NATO conventional defense; sensors, realtime ADP, ICM
  - NATO response hesitant → CMF as roadmap (MC, 1985; SACEUR, 1986)
  - IEPG response supportive (1985)
  - CNAD Ad Hoc Group ET/LT = 19 technology areas/183 projects (list)
  - DRG PI assumed ET/LT overview in 1987
- CDI/BTI:
  - Kicked off by Senator Nunn (1986) to complement SDI
  - Thrust (original):
    - (CDI) "constitutes the start of a dedicated comparative evaluation program in which systems developed in other countries or for other applications are evaluated for use by U.S. armed services" (FY87 authorization $162M for demonstration projects)
    - (BTI) "expand research on innovative concepts and methods of enhancing conventional defense capabilities" (with emphasis on smart munitions, armor/antiarmor, intelligence and battle management) and "facilitate restoration of the conventional defense technology base" (FY87 authorized $453M)
  - OSD Program Planning Committee: OUSD(A)-R&AT, IIP, Tact Warfare, Nuclear Warfare; DARPA; OUSD(P); SDIO;OJCS
  - Committee and Service nomination for BTI: 250 projects (late 1986)
  - R&AT selection criteria: technologies for critical conventional defense needs; enhancing current capabilities; complementary to ongoing work with high payoff from additional funding; joint programs (DARPA/Services, multi-Service, international cooperation); within 5 threat areas → 35 projects selected (early 1987) → 48 projects (1988) (list)
  - Program briefing to NATO bodies, November 1987
  - New BTI starts for FY89

U.S. INITIATIVES IN INTERNATIONAL TECHNOLOGY COOPERATION

Two recent U.S. attempts to revitalize cooperative research are summarized on this chart: One is the emerging technology (ET) initiative by Secretary Weinberger proposed to the Defense Planning Committee (DPC) in the Spring and Fall 1982 meetings. The second is the conventional defense initiative (CDI)/balanced technology initiative (BTI) by the U.S. Congress in 1986. The ET initiative was intended to focus NATO cooperative research on the application of ET to enhance NATO's conventional defense, with particular emphasis in three areas: sensor technology, real-time automatic data processing (ADP) systems, and improved conventional munitions (ICMs), including terminal-guided submunitions. The expectation was that a large number of relatively small R&D projects would result from this initiative, with proposals solicited from all NATO nations, using CNAD and MC for review and selection of projects, and using existing CNAD bodies for further study and development as joint projects with pro-rata support from participating nations. The initial response in NATO circles was hesitant, which in due time lead to the idea of developing a CMF as a roadmap for future requirements. The CMF, essentially a matrix of 8 key mission areas by 25 functional areas developed by the MC, was approved in 1985 by the DPC for incorporation into NATO's standard force planning process. The SACEUR's CMF, which became av. lable in 1986, provides a prioritized breakout of qualitative and quantitative improvements required for the year 2000 and beyond. In 1985, CNAD established an ad hoc group on emerging technology in the long term (ET/LT), and this group compiled a list of 183 candidate projects in 19 technology areas over the next two years, 1985-1986. Oversight of this effort was transferred in 1987 to the DRG, Panel I. A later chart identifies the technology areas involved. We have not been able to reconstruct from available information what the present status is of those projects. The second initiative had two thrusts as shown on the chart: CDI, in the original authorizing language, sounded very much like Foreign Weapons Evaluation (FWE) or International Materiel Evaluation (IME), BTI sounded very much like ET. By late 1986, the special OSD committee received a total of 250 project nominations for BTI. Ultimately, 35 were selected in early 1987. In the selection process, consideration was given to whether the candidate was an international cooperative effort. The BTI program was briefed to NATO in late 1987. By FY89 it had grown to 48 projects and new starts for FY89 were reviewed in December 1988. The next two charts show the current total BTI program and the Army's portion of CDI and BTI. CDI was essentially terminated in 1988, although NATO's Conventional Defense Improvement program, which uses the same acronym, continued.

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OVERVIEW OF BTI PROGRAM (1988)

Funding Dollars in Millions
(Years are Fiscal Years)

	1987	1988	1989	1990	1991
Smart Weapons Technology					
Millimeter wave seeker demonstration	4	6	12	15	*
High-performance infrared seeker	4	6	12	20	15
Joint infrared/laser seeker	4	6	10	15	5
Multimission seeker development	5	7	10	10	5
Autonomous guidance for conventional weapons	8	10	15	*	*
Automatic target recognition for smart weapons	5	8	12	15	10
Submarine antitorpedo weapons	6	8	12	20	15
Deep battle weapon concept	3	7	10	10	5
Guided tactical hypervelocity projectiles	6	10	15	20	20
Monolithic infrared focal plane arrays	1	3	6	10	10
Expert systems for manufacture of smart weapons components	2	5	12	15	20
Infrared focal plane array producibility	2	0	0	0	0
Totals	**50**	**76**	**126**	**150**	**105**
Armor/Antiarmor Technology					
Enhanced kinetic energy weapons	3	6	12	10	5
Liquid propellant gun	2	6	8	*	*
Advanced composite gun	1	2	5	8	5
Coilgun technology development	4	6	12	15	20
Short-range antitank weapon	3	5	10	7	*
Command adjusted trajectory	2	6	10	12	12
Follow-through torpedo warhead	2	2	3	5	5
Ground-launched Hellfire	3	8	10	*	*
Advanced mine/countermine technology	5	5	10	15	12
Amphibious assault countermine system	2	3	5	*	*
Armor materials	2	3	5	*	*
Enhanced computational capabilities for advanced weapon system development	3	5	5	5	5
Penetrator/target interaction flash X-ray facility	4	0	0	0	0
Totals	**36**	**57**	**95**	**77**	**64**

*Funding requirements have not been established

	1987	1988	1989	1990	1991
RSTA/BMC3 Technology					
Undersea surveillance	20	25	30	30	20
Tactical use of national technical means	5	8	11	0	0
Digital topographic support system	3	3	0	0	0
Target acquisition for ship defense	4	10	2	0	0
Aided target acquisition	5	8	18	25	20
Fiber-optic data link for air launched weapons	3	6	8	*	*
Combat vehicle command and control	2	7	14	10	7
Optical signal processing technology	3	7	15	20	20
Multisensor autoprocessor technology	2	3	3	3	3
Totals	**47**	**77**	**101**	**88**	**70**
High-Power Microwaves (HPMs)					
HPM effects testing	7	6	8	*	*
HPM hardening	1	2	3	*	*
HPM components development	4	4	6	*	*
HPM propagation/phenomenology	2	2	2	*	*
HPM methodology	1	1	1	*	*
Totals	**15**	**15**	**20**	*	*
Special Technology Opportunities					
Tactical missile interceptor technology	13	32	20	20	20
High-energy laser for ship defense	2	3	0	0	0
Enhanced blast munitions	2	3	8	*	*
ASTOVL technology	5	0	0	0	0
Active optical countermeasures	2	5	10	20	15
High power/energy density batteries	2	3	3	4	4
Superconducting ceramic materials	2	5	10	20	15
Cruise missile advance guidance	3	7	*	*	*
Advanced close air support technology	3	5	*	*	*
Totals	**34**	**63**	**51**	**64**	**54**
Total of all projects	**182**	**278**	**393**	**379**	**293**

OVERVIEW OF BTI PROGRAM (1988)

This is an overview of the BTI program as it stood in 1988.

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ARMY PORTION OF CDI/BTI

CDI	1987	1988	1989	BTI (1987/1988)[1]
Guard/Reserve Unique R&D	X	X	X	Joint IR/Laser Seeker
Mine Flail Wheeled Vehicle	X			Digital Topographic Support System (DTSS)
Stinger System Safeguard	X	X		Aided Target Recognition
Tactical RPV Evaluation	X			Combat Vehicle Command & Control (CVC2)[2]
Quiet Generators	X			Liquid Propellant Gun
Helicopter Air-to-Air Missile	X			Coilgun Technology Development
Close-in Air Defense	X			Command Adjusted Trajectory (CAT)
MILAN II and BOFORS BILL Evaluation	X	X		Ground Launched Hellfire
Ammunition Containerization	X	X		High Power Microwave (HPM)
AH-64/UH-60/OH-58 Upgrades	X	X		Tactical Missile Interceptor Technology [2]
Combat Vehicle Support System	X	X		
Chemical Mask Improved Drinking System	X	X		
Multipurpose Individual Munition Evaluation	X	X		
Rifle-lanched AT Round Evaluation	X	X		
Combat Diesel Engine	X	X		
Weasel Evaluation	X	X		
ARDVARK/LVS Integration	X	X		
Recovery Vehicle ARV-90	X	X		
Ground Launched Hellfire [2]	X	X		

[1] Excludes new starts for FY89 (20 Army candidates) with selection pending November 1988. SARD-TR is approval authority for Army; DoD Selection Committee chaired by ODUSD (R&AT)

[2] International Program

ARMY PORTION OF CDI/BTI

As indicated on this chart, the Army's portion of CDI included one international cooperative program; BTI includes two.

OVERVIEW OF DRG ET/LT CANDIDATE PROJECTS

AREA	SAMPLE TECHNOLOGIES
Radar	Solid state microwave components; antenna (phased array); microwave integrated circuits
Sensors	High density monolith EO/IR sensor systems; clutter suppression; active EO-AO filters; IR imagery; millimeter wave devices + UV; active/passive acoustic and seismic sensors (including sonar); electronic support measures (ESM); microwave integrated circuits; multispectral seekers
Situation Assessment Related	Signal and data processing; expert systems (AI); pattern recognition; anti-jam techniques; detection and acquisition algorithms; holographic techniques; advanced display technologies; simulation technologies
Structures	Lightweight structures/components
Survivability Enhancement	ECM & ECCM; EMP protection; signature reduction; position location and navigation; signature generation/anti-simulation
Warhead Related	Small shaped charge; self-forging fragments; small KE devices; armor and concrete penetration
Laser	Device technology; laser/atmospheric interactions; laser beam/materiel interactions
Man/Machine Interface	Operator workload; sustained operations; effectiveness in adverse environments
Materials	Advanced composites; ceramics; rapid solidification; compound semiconductors; multiphasic and layered compounds; optical ceramics; powder metal technology; fibre optics

OVERVIEW OF DRG ET/LT CANDIDATE PROJECTS

This chart summarizes the DRG ET/LT candidate projects. There is some overlap between this program and BTI, and we are not quite sure who is responsible for ensuring that there is no unnecessary duplication of effort.

OVERVIEW OF DRG ET/LT CANDIDATE PROJECTS
(continued)

AREA	SAMPLE TECHNOLOGIES
Microelectronics	VLSI/VHSIC; non-volatile solid state memories; gracefully degradable chips; optoelectronics
Military Robotics	Underwater robot vehicles and devices; land warfare devices
Power and Propulsion	Adiabatic turbo-compound engines; homopolar drive systems; adiabatic turbofan engines; propellants and fuels; hypervelocity missiles (EM launcher); underwater power sources
Production	CAD/CAM; net shape processing
Chemical and Biological	Detection of agents; protection techniques; human factors
Communications	Secure survivable comm; distributed comm; integrated data; text and voice networks; packet switching; gateways
Computer Software and Hardware	Microprocessors; distributed databases; high order language (HOL) development; supercomputers; computation methods; improvement of software efficiency and reliability; improved tools for software development; parallel processing techniques
Design and Fabrication	Major tradeoffs and RAM-D; relaxation of specifications as part of design for low cost
Environmental Modelling	Ocean modeling; atmospheric modeling/weather forecasting
Guidance and Control	Gyroscopic and inertial devices; stabilization techniques; multi-mode processing; on-board signal and data processing

OVERVIEW OF DRG ET/LT CANDIDATE PROJECTS (repeated)

This chart summarizes the DRG ET/LT candidate projects. There is some overlap between this program and BTI, and we are not quite sure who is responsible for ensuring that there is no unnecessary duplication of effort.

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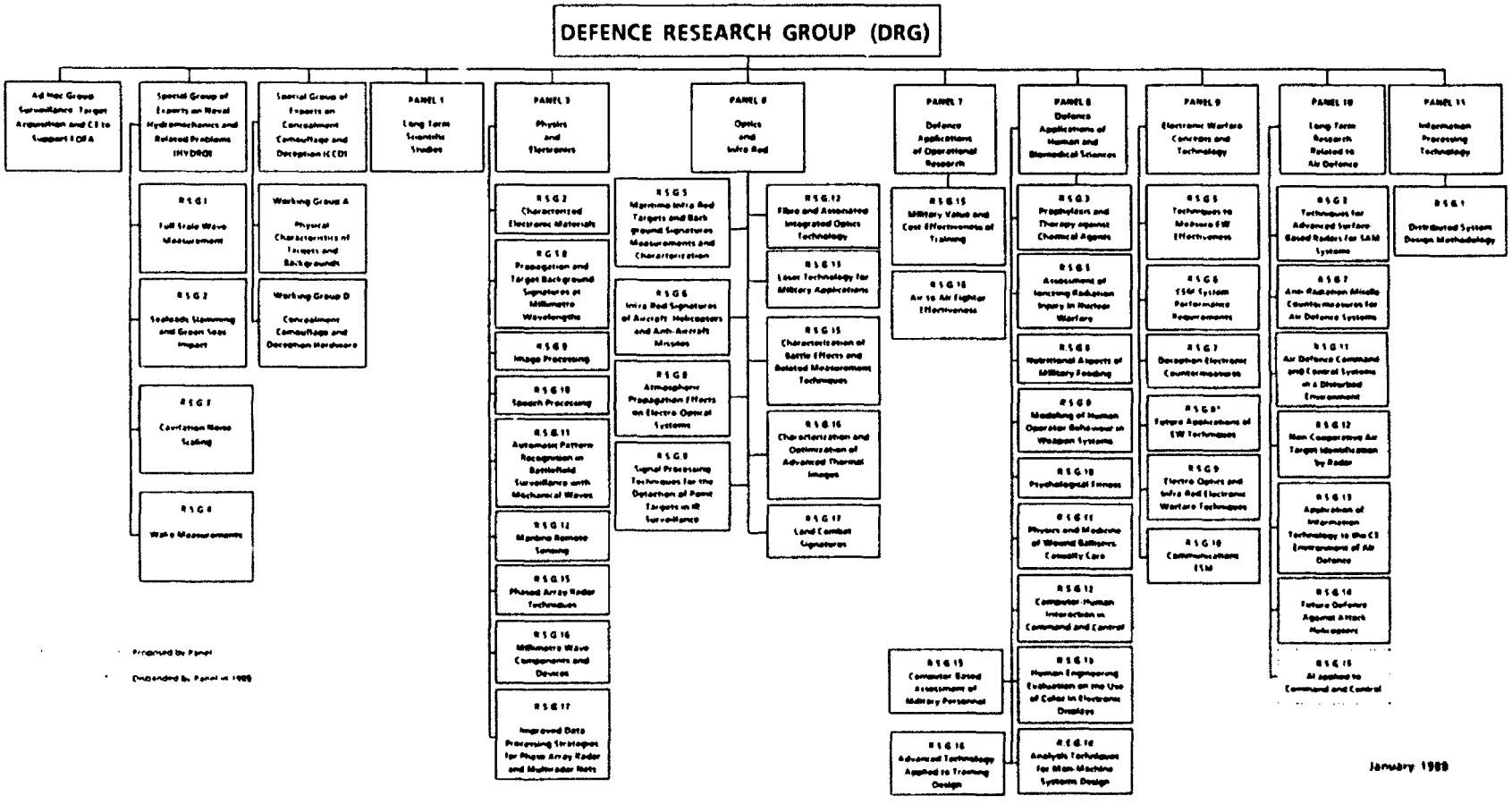
NATO DEFENSE RESEARCH GROUP (DRG)

- Created in 1966 (successor to the 1964 Committee of Defense Research Directors)
- Chair: National Representative (elected for 2 years, currently NO)
  Vice-Chair: Director of Armaments and Defense Research (IS)
  Members: SNR of member nations (U.S.: DUSD(R&AT), Dr. Millburn)
- Meetings:
  - biannual, 2 days duration
  - attended by reps of NMAs and Division of Scientific Affairs (IS)
  - overview/guidance of subordinate bodies; policy/programs; TORs
  - annual report to CNAD
- TOR:
  (1) Exchange information on new research and technology
  (2) Study military consequences of advances in science and technology
  (3) Identify suitable areas for cooperative research and establish subordinate bodies as needed to pursue such activities
  (4) Cooperate and maintain liaison with the Service Armaments Groups to avoid duplication of effort
  (5) Undertake studies at request of Armaments Groups in fields where requirements cannot be met without significant advance in technology
- Main activities:
  - (1) and (3) in Research Study Groups (RSGs) of the various Panels
  - (2) in Long Term Scientific Studies (LTSSs) of Panel I and OR studies of Panel VII
  - (4) and (5) have been problematic

NATO DEFENSE RESEARCH GROUP (DRG)

The DRG is one of the Main Groups under CNAD. Its TOR specify the major tasks as listed on the chart. It is composed of numerous subordinate groups: Research Study Groups (RSGs) respond to the first and third tasks in the TOR, and two panels, P I and PVII, respond to the second task. The DRG has in recent years acknowledged that it had some problems in responding to the fourth and fifth tasks in the TOR. It has taken some steps to improve its liaison with the Service Armaments Groups. Its organizational structure is shown on the next chart.

DRG ORGANIZATIONAL STRUCTURE



DRG ORGANIZATIONAL STRUCTURE

The DRG has eight panels with subordinate RSGs and a couple of Special Groups of Experts. As tasks are completed, RSGs may be disbanded and new RSGs established in new technology areas.

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U.S. PARTICIPATION IN THE DRG

- U.S. is the only nation to participate in all 60 DRG bodies:
  - participant (open group): 31
  - member (closed groups): 15
  - chair (pilot nation): 14
- U.S. Army chairs 6 bodies:

Panel/Subgroups	Date Est.	Chairman (Army Agency)
P3 RSG 11	Mar 78	Army Engineer Waterways Exp. Sta, WESEN-B, Vicksburg, MS
P4 RSG 13	Sep 79	Night Vision Electro-Optics Lab, AMSEL-RD-NV-D, Fort Belvoir
P4 RSG 17	Sep 82	Night Vision Electro-Optics Lab, AMSEL-RD-NV-D, Fort Belvoir
P8 RSG 8	1981	Army Research Institute for Environmental Medicine, Natick, MA
P10 RSG 7	Jan 79	MICOM, AMSMI-RDW/A, Redstone Arsenal, AL
P10 RSG 14	Mar 87	MICOM, AMSMI-RD-SS, Redstone Arsenal, AL

- Output: – reports, IEX, draft STANAGs, workshops, software models, tests/experiments
- Collaborative projects:
  - work done by participating nations, no exchange of funds

U.S. PARTICIPATION IN THE DRG

U.S. participation in the DRG is summarized on this chart. The U.S. Army provides the chairmen of the six bodies identified here. The output of the various RSGs consists of reports, workshops, software models, and some draft STANAGs. Collaborative projects essentially consist of cooperative work by each participating nation with complete information exchange but no exchange of funds – i.e., each participating nation does its agreed share of the project.

FINDINGS ON DRG SUBGROUP ACTIVITIES AND RESULTS

- Recent efforts (Jan 87) to improve coordination and liaison with Main Armaments Groups (MAGs)
  - Defense Research Section, Armaments and Defense Research Directorate, IS to brief MAG subordinate bodies annually
  - MAGs to request subordinate bodies to identify research needs for DRG
  - DRG subordinate bodies to support review of draft documents (ONSTs, NSTs, STANAGs) within their areas of expertise
  - Main mechanism for cross-fertilization remains contacts at national level; national reps to DRG and MAGs urged to coordinate their activities nationally
  - DRG Newsletter (first issue Feb 87); Handbook on Procedural Guidelines (Jan 1988)
  - Plan of Action (Sep 87 DRG Meeting) based on CMF.
- Most panels/RSGs meet twice a year; duration ranges from 2-3 days (panels) to 3-7 days (RSGs).
- No information available on tangible results.
- Review of PI
  - LTSSs are performed for MNCs and find application in MAGs, MNCs, and nations (e.g., LO/2000 briefed to NAAG, MC, and SHAPE)
  - Each LTSS has a specific study director; 1987 report lists completed studies (command function survivability; power sources/devices for tactical applications) and planned studies (new armored vehicle concepts; applications of ET to combat engineering operations), various workshops on specific topics, and LTSS proposals.
  - The ET/LT task is limited to reviewing tabled projects and identifying gaps.

FINDINGS ON DRG SUBGROUP ACTIVITIES AND RESULTS

The only information available to us was the DRG annual report for 1987, and this chart summarizes our findings. In 1987, there were clear attempts to improve the coordination with the Service Armaments Groups, but the best mechanism remains at the national level. There was also a recognition that the DRG's study program ought to have some relationship to future military requirements as identified in the CMF. Thus, in late 1987, the DRG for the first time adopted a plan of action keyed to the CMF. Although there may be tangible results, they are hard to identify. In the case of Panel I some efforts find direct application because they are essentially sponsored by the MNCs. This panel's work in ET/LT is limited to reviewing the 183 projects and identifying any gaps. It does not supervise, monitor, or assess the progress, if any, on those projects. There are legitimate questions about the effectiveness of the DRG as a cooperative forum, but for a more complete assessment we would need access to much more detailed information than is available through AMCICP or SARD-IN.

THE TECHNICAL COOPERATION PROGRAM (TTCP)

ORIGIN

- "Declaration of Common Purpose" (U.S. President - UK Prime Minister, October 1957): "Countries of the free world are interdependent . . . only in partnership can progress and safety be found"
- CA joined in common effort → Tripartite Technical Cooperation Program, 1958
- Combined Policy Committee (Foreign and Defense Ministers + Heads of Atomic Agencies, U.S -CA-UK)
- Two Subcommittees: Cooperation in atomic field and non-atomic military R&D (NAMRAD)
- AS joined NAMRAD in 1965; NZ in 1969

AIMS

- Information exchange on national defense R&D programs
- Cooperation in R&D (6.1, 6.2, and 6.3A)
- Eliminate unnecessary duplication among national programs

POLICIES/PROCEDURES

- DoD Instruction 3100.8
- POPNAMRAD Manual
- TORs for all bodies
  - NAMRAD Subcommittee: "NAMRAD Principals" - U.S.: DUSD(R&AT)
  - Day-to-day management: "Washington Deputies" - U.S.: DUSD(R&AT)
  - Subgroups: 11 SGs (technology area) with 52 TPs and 18 AGs (1988)
    1 AHSG and 2 TLGs

THE TECHNICAL COOPERATION PROGRAM (TTCP)

The other cooperative forum in this category is TTCP. This chart summarizes the background, aims, and procedures for this program. All bodies involved in the program from the Non-Atomic Military Research and Development (NAMRAD) principals at the top to all subgroups and subordinate technical panels (TPs), action groups (AGs), ad hoc study groups (AHSGs), and technical liaison groups (TLGs) have specific TOR.

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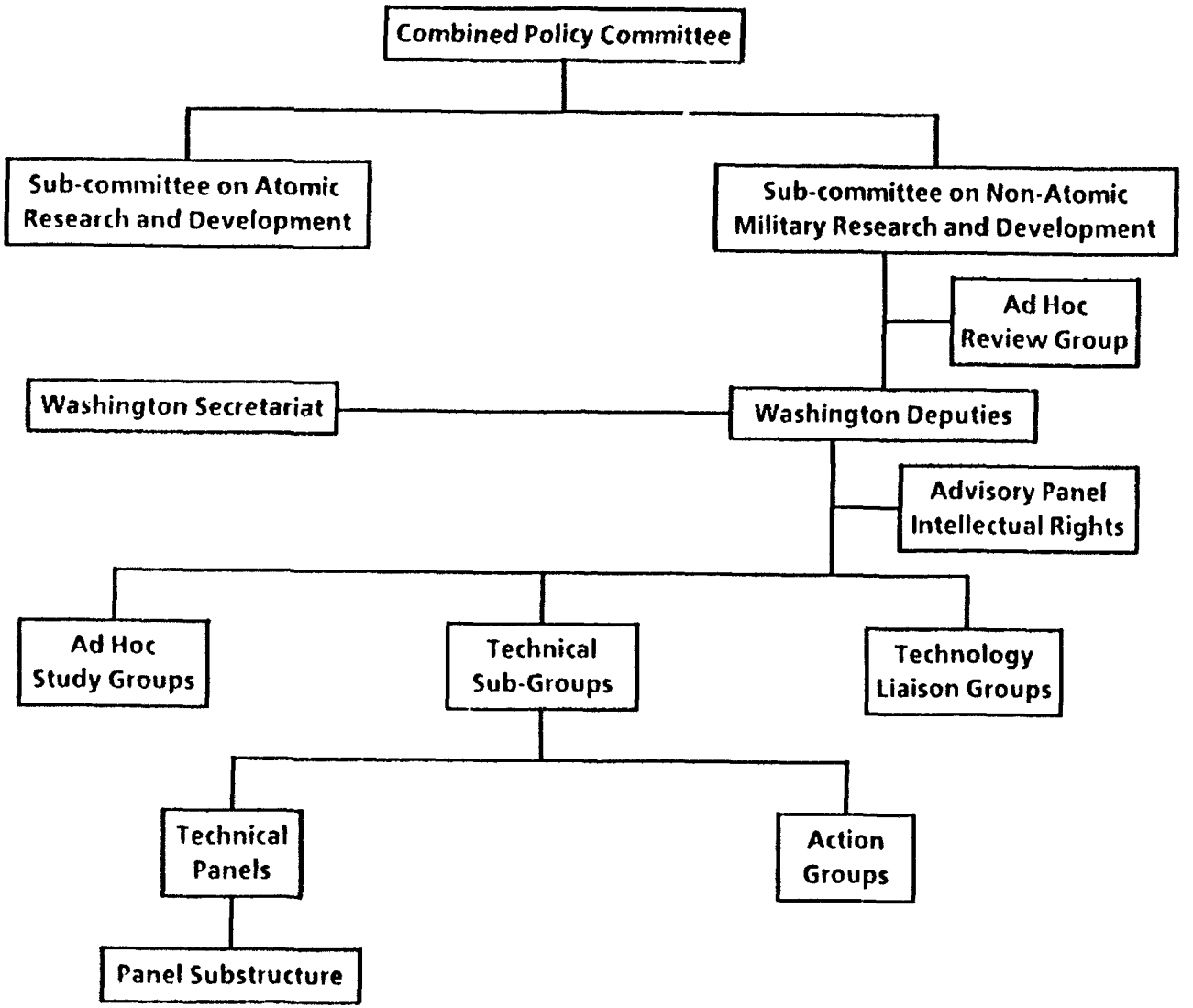
ORGANIZATIONAL STRUCTURE OF TTCP



ORGANIZATIONAL STRUCTURE OF TTCP

The organizational structure of TTCP is shown on this chart. The Washington Deputies are responsible for routine management of the program. Most of the work is done in the subgroups and their subordinate technical panels.

TTCP SUBGROUPS

SUBGROUP	Chair	U.S. Lead	No. of U.S. Personnel	Army Rep	No. of Army Personnel	Subordinate Groups	
						No. of TPs	No. of AGs
E – Chemical Defense	CA	ODUSD(R&AT)	6	HQDA, DAMA-CSS-C CRDEC	2	5	3
G – Undersea Warfare	U.S.	ONR, ASW/Undersea Tech	2		0	5	1
H – Aeronautics	AS	ODUSD(R&AT)	5	HQDA, DAMA-WSA	1	5	2
J – Electro Optic/IR	UK	ODUSD(R&AT) MSI	4	CNVED	1	4	2
K – Radar	UK	DARPA, Tact. Techn. Office	7	MICOM, AMSI-RD-AS HDL, DELHD-RT-RC	2	4	3
P – Materials	AS	ODUSD(R&AT)-MST	5	Mat. Tech. Lab	1	5	1
Q – Electronic Warfare	U.S.	ODUSD(R&AT)-EST NRL, Tactical EW Div	7	CECOM ASWC, DELSW-OS	2	6	4
S – Communications	U.S.	RADC, Comm. Div	4	CECOM, AMSEL-RD-C³	1	4	0
U – Behavioral Sciences	CA	ODUSD(R&AT)	3	ARI	1	3	0
W – Conventional Weapons	AS	ODUSD(R&AT)-MST	4	BRL, AMX BR-OD	1	6	2
X – Computing Technology	UK	ODUSD(R&AT)-CET	2		0	5	0
TLG3 – Nuclear Weapons Effects	U.S.	DNA, Aerospace Div	1		0	52	18
TLG4 – Electron Devices	UK	ODUSD(R&AT)-CET	1		0		
AHSG – 110 RAM	U.S.	ODUSD(R&AT)	2		0		

TTCP SUBGROUPS

This chart gives an overview of the 11 TTCP subgroups, indicating the national chair, the U.S. lead, and the U.S. Army representation on each subgroup. As indicated in the last two columns, each subgroup has a number of TPs and AGs, so that the total number of bodies in TTCP subordinate to the subgroups totals 73.

NUMBER OF U.S. ARMY PERSONNEL IN TTCP BODIES*

Bodies	No. in which Army Participates	Type of Participation**		
		Chair	National Lead	Member
11 Subgroups	9	0 (3)	0 (11)	12 (40)
52 Technical Panels	35	1 (13)	13 (47)	43 (144)
18 Action Groups	7	0 (5)	4 (13)	3 (12)
3 Technical Liaison Groups/ Ad Hoc Working Groups	0	0 (2)	0 (3)	0 (1)

* Total U.S. Army personnel, 75; total U.S. personnel, 271.
** U.S. participation is indicated in parentheses following Army participation.

SOURCES OF U.S. ARMY PERSONNEL FOR TTCP PARTICIPATION

Agency	No. of Army Personnel	TTCP Body	Agency	No. of Army Personnel	TTCP Body
HQDA	2	SG-E, SG-H	NVEOC	4	SG-J, JTP-5/10/13
CECOM	11	SG-W, SG-S, JTP-12, QTP-10, STP5/6/8/9, XTP-2	AMSAA	2	WTP-6
MICOM	10	SG-K, JAG-12, HTP-1, KTP-3/4, WTP-2/4/5	ARDC	2	HTP-3, HAG-8
CRDEC	9	SG-E, ETP-4/5/7/8, EAG-24/33	ASWC	2	SG-Q, QAG-9
MTL	7	SG-P, PTP-1/2/3/4/5	HDL	2	SG-K, WTP-3
BRL	6	SG-W, WTP-1/2/4/5, WAG-10	MRICD	2	ETP-1, EAG-32
AEWL	5	QTP-10/14/16/17	MRIID	1	ETP-4
ARDEC	4	ETP-7, WTP-2/3/5	HEL	1	UTP-4
ARIBSS	4	SG-U, UTP-2/3/4	WSMR	1	HTP-1

NUMBER OF U.S. ARMY PERSONNEL IN TTCP BODIES

This is a more detailed breakout of U.S. Army participation in the program. A total of 75 U.S. Army representatives are identified as members in the program. The agencies they belong to are identified at the bottom of the chart.

MANAGEMENT PROCESS

- Washington Deputies
  - Meet every 6 weeks and review 1 or 2 SGs in detail
  - Determine need for changes in study program
  - Establish/terminate subordinate groups and approve TORs
  - Appoint Executive Chairman for each subgroup (normal term 3 years)
  - Establish ad hoc study groups as needed and act on recommendations
  - Act as "Cognizant Deputies" for specific subgroups (U.S. Deputy: SG-J, Q, U, and TLG-4) and attend SG meetings
  - Seek to avoid duplication and ensure proper communication channels
  - Select candidates for annual TTCP Achievement Awards from nominations by SGs
- Washington Secretariat
  - Provides support to all TTCP bodies
  - Publishes: Annual Report, TTCP Roster, POPNAMRAD, TOR Supplements
- Recent Events
  - Concerns about TTCP effectiveness
  - Ad Hoc Review Group on future direction of TTCP mandated by 22nd NAMRAD Meeting (1986)
  - Group reported at 23rd NAMRAD (1987)
  - Noteworthy decision:
    - Special NAMRAD Meeting (March 88) for in-depth review of each SG (presentation by chairmen)
    - Annual Reports to include section on applications
    - Washington Deputies to establish liaison with ABCA Standardization Program

MANAGEMENT PROCESS

The management process for TTCP is straightforward. Washington Deputies meet on a regular basis, and, in the course of a year, review the study program and results of each subgroup (SG). The study program is largely a result of deliberations within each SG with proposals that must be approved by the Washington Deputies. In recent years there has been some concern about the effectiveness of the program, so in 1986 a special group was created by the NAMRAD principals to examine the future directions for TTCP. Some of the decisions that resulted are shown at the bottom of the chart. We have not seen the results of the March 1988 meeting in which each SG chairman was supposed to evaluate the effectiveness of the SG in terms of tangible results. Annual reports are now required to include a section on applications, which was absent in previous reports, and the idea to establish liaison with the ABCA program is clearly inspired by the aim to make TTCP more responsive to future military needs.

SUBGROUP "W" (CONVENTIONAL WEAPONS TECHNOLOGY) SURVEY

- STATISTICS

FORM OF INFORMATION EXCHANGE		1987	1986	1985
Exchange of Scientists	Total	28	8	12
	From/To U.S.	4/7	1/4	2/?
Exchange of Documents	Total	510	497	317
	From U.S.	204	151	124
Exchange of Materials	Total	55	59	35
	From/To U.S.	n.a.	27/11	19/8
Meetings	SG: 1/year, 7 days TP/AG: 1/year, 3-7 days Specialist (KTA WPs, FOs, joint experiments, seminars)	42	n.a.	n.a.

Collaborative Tasks (KTAs)	1984-1987	1981-1984	1978-1981
Completed	18	10	15
Started	12	6	11
In process	6	19	11

- STRUCTURE (1987)

Technical Panels/Action Groups	Key Technical Areas	Focus Areas
WTP-1, Terminal Effects	9	10
WTP-2, Launch/Flight Dynamics	3	5
WTP-3, Fuze Technology	2	–
WTP-4, Propulsion Technology	6	9
WTP-5, Guidance & Control Technology	5	–
WTP-6, Weapons System Effectiveness	6	4
WAG-10, Tank Gun System Accuracy	n.a.	n.a.
WAG-11, Hazards of Energetic Materials	n.a.	n.a.

SUBGROUP "W" (CONVENTIONAL WEAPONS TECHNOLOGY) SURVEY

This chart summarizes the activities and accomplishments of the TTCP subgroup we picked for the survey. Because of the limited information available, we did not try to fill out a survey form. The top table on the chart gives statistics on the extent of information exchange over the last few years. The middle table shows the number of collaborative tasks in key technology areas (KTAs). The bottom table depicts the activities in process as of late 1987 in each subordinate group. KTAs essentially are synonymous with ongoing technical studies. Focus areas are specific areas singled out for ongoing information exchange.

FINDINGS ON TTCP SUBGROUP ACTIVITIES AND RESULTS

- Perceived by OSD as "our most effective international cooperation mechanism," but:
  - No evidence R&D program focused on most important U.S. military needs
  - No evidence of coordination with efforts in other bodies
  - No evidence of any mechanism to ensure research accomplishments are applied in weapon system development: left to SMEs at MSCs/Labs
  - Only known tangible result is CAM, currently being fielded (U.S., UK).
- Direction of program is determined by SGs (based on expressed national interests of at least 2 nations) and Washington Deputies:
  - No input or interface with HQDA or HQ AMC
  - Interface directly with cognizant lab

    (e.g. Cognizant Deputy for SG-P pushed cooperative R&D program for improved garments for both laser and chemical protection; coordinated directly with PM chemical defense, Natick R&D Center; OUSDRE supports this initiative; assumption is that Army channels will inform SARD and AMCICP).
- More thorough investigation necessary to ascertain whether important research products are in fact followed up in Army acquisition plans (example: new material for gun barrel linings).
- HQ LABCOM is not managing Army participation in TTCP either.
- Self-Assessment of Achievements: Quote – "While the undertaking of cooperative programs to advance technology may be the most visible amongst TTCP activities, it is fallacious to accord them significance as measures of success of the program. Exploratory development at weapon system/subsystem level is beyond the realm of practicality of SG activity. Rather, the SG sponsors collaborative programs that foster advance of national capabilities for development."

FINDINGS ON TTCP SUBGROUP ACTIVITIES AND RESULTS

Findings on TTCP are summarized on this chart. As in the case of the DRG forums, there are legitimate questions about the effectiveness of TTCP because there is no mechanism to ensure that the R&D program is in accordance with U.S. prioritized needs or that R&D results find application in weapons system development, and there is no evidence that the program is coordinated with other bodies to eliminate duplication. The only tangible result for the Army appears to be the chemical agent monitor (CAM) that is now being fielded. Both HQDA and AMC are outside the loop in determining the direction of the program; the assumption is that the MSCs or PEOs will keep those headquarters informed. The bottom notation provides a quote from a recent TTCP report that captures the spirit of the program and the difficulty of assessing its effectiveness.

APPRAISAL OF PRODUCTIVITY OF FORUMS

Attribute/Measure	Forums					
	Bilateral WGs under Staff Talks	Bilateral WGs under DEA/MOA	SNR(A) WGs	ABCA QWGs	NAAG Panels/ Subpanels/WG	MAS (Army Board) WPs
Priority: Ranking of cooperative R&D in work priorities	First	Second	Third	Last	First	Beyond TOR
Size: Number of participating nations	2	2	4	4 (+ 1 observer)	Panels: 12 Subp 7 WGs: 4-7	Board 14 WPs: 12
Seniority: Rank of HoDs to parent forum and to WG level	GO GO/SES	GO GO/SES	GO O-4 to O-6/civ	GO O-4 to O-6/civ	GO O-4 to O-6/civ	O-6 O-5/civ
Representation: Principal U S Army player in parent forum and at WG level	TRADOC AMC	AMC MSCs	HQDA & TRADOC HQDA (3), AMC (4), TRADOC (1)	HQDA & AMC HQDA (6), TRADOC (8), AMC (5)	HQDA HQDA (6), AMC (4), TRADOC (1)	HQDA HQDA (5), AMC (3), TRADOC (8)
Longevity: Year in which parent forum established and WG came into effect	GE UK FR 1975 1978 1979 1979 - -	FR 1986 1986	1977 1978	1965 1971	1963 (1966) 1969	1951 1970/1971
Intensity: Frequency and duration of WG meetings	1/year 5 days	1/year 5 days (incl visits)	1/6 mo- 1/year 3-5 days	1/18 months 5 days	1/6 months 2 days	1/year 5 days
Productivity: Output/Input	?	?	?	?	?	?
Output: Information Exchange	High	High	Medium	High	Medium	Medium
Standardization Agreements	3 MOUs & 3 MOAs	-	~5 MOUs (Est)	~400	~50	~200
Cooperative Projects (Concept Exploration)	0	1 MOU (draft)	-	-	8	-
Cooperative Projects (Validation/FSD)	2/0	-	-	-	5/0	-
Cooperative Production/ Reciprocal Procurement	5+	-	-	-	-	-
Input: Annual manyears						
Costs						

APPRAISAL OF PRODUCTIVITY OF FORUMS

The entire briefing can now be wrapped up in a matrix that relates forum results to forum characteristics. The two pure research forums, DRG and TTCP, have been omitted from this chart. The top six rows list some characteristics of each of the six forum categories; the seventh row is titled "productivity," but because there are no data available on input and because the output consists of different things, we have not tried to put a number on productivity. The various outputs that can be attributed to each forum category are shown in the next five rows.

AR705 - 50

ISSUES AND OBSERVATIONS

- Army has no centralized reporting system on its investment in forum participation.
- Army has no systematic evaluation process for monitoring the productivity of forums for armaments cooperation.
- Army has no centralized management of cooperative technology base R&D.
- Most MOUs for cooperative R&D have resulted from efforts outside the institutional forums (but, information exchange and concept harmonization discussions in those forums may have been instrumental).
- Corporate memory and existing records are inadequate to reconstruct important events.
- A study of the origins of existing materiel MOUs may be illuminating:

Classification	Bilateral	Trilateral	Four Power	Multilateral	Total
IEX/Standardization	12	2	3	1	18
Cooperative R&D	11	–	–	2	13
Other	2	1	–	–	3
Total	25	3	3	3	34*

* Includes 5 in negotiation but not signed, as of January 1989.

- The institutional forums, as presently constituted, are necessary for information exchange, dialogue, and standardization (doctrine, procedures, materiel), but are not an effective mechanism for generating MOUs for cooperative development efforts.

ISSUES AND OBSERVATIONS

This final chart highlights some issues and presents some observations. The first three point to things that AMC or HQDA require to get a better handle on international cooperative efforts: (1) some kind of centralized audit trail of Army investments in forum participation, (2) development of a procedure for evaluating the effectiveness or productivity of these forums in a manner that would be somewhat similar to procedures under development for evaluating STANAGs, and (3) institution of some kind of database on what goes on in the DRG and TTCP and AMC input into the direction those programs should take. The next item is the factual statement that most MOUs on the books today have been the result of efforts outside the institutional forums that we covered. Those MOUs with Army involvement are summarized in the matrix.

The bottom line is that the institutional forums may be necessary or desirable but do not constitute a very effective mechanism for generating cooperative MOUs.

APPENDIX

INTERNATIONAL ARMY ARMAMENTS COOPERATION FORUMS SURVEY FORMS

CONTENTS

International Army Armaments Cooperation Forums Survey

1. Full Identification (forum and parentage)
Army Armaments Working Group under
US/GE Army Staff Talks

Abbreviation: AAWG

2. U.S. Proponent
- ☐ OSD
- ☐ Army Staff
- ☐ SARD/PEO
- ☐ AMC
- ☐ SARD-IN
- ☒ TRADOC
- ☐ Other (Identify:)

3. Charter
Ministerial MOU on defense materiel cooperation, October 1976
MoA (HoDs Steering Committee to Staff Talks), October 1976
Procedural Rules (HoDs AAWG), July 1981

4. Purpose Increase military effectiveness through cooperation, including standardization, interoperability, and cooperative R&D

5. Structure: AAWG operates under guidance of Steering Committee to Staff Talks and utilizes ad hoc Working Groups of Experts as needed subject to SC approval

6. Forum Category

Forum Class	Forum Type	Representation	Seniority of Chairman	Focus
☒ Permanent	☒ Bilateral	☐ Military	☒ General Officer/SES	☐ Functional Area
☐ Temporary	☐ Multilateral	☐ Civilian	☐ O-6/GS-15/16	☐ Commodity
		☒ Both	☐ Other	☐ Weapons System

☐ Components
☐ Technology Base
☒ Other: Any

7. Activity
Start date (month/year): Jan 79
Meeting interval: 12 months
Meeting duration: 5 days

Number of nations: 2 total (incl. USA)
2 active
__ observers

Status on 1/1/88:
☒ active
☐ inactive
☐ terminated

Comments on activity level: Fluctuating; AAWG is 1983 successor to Non-Major Item WG when scope was expanded and GE MOD restructured.

Identification of participating nations: (circle chair) US, GE
HoDs co-chair

8. U.S. Army Participation
Army principal delegate: AMC, AMCICP-AD, SES
(agency, office code, rank)
Other Army agencies represented: TRADOC HQ & LNO to Heeresamt, USARDS Group GE
Average number of Army participants: 5-10 + observers (variable)

Estimated resources invested annually by U.S. Army:
dedicated billet(s): __
total manyears: __ N/A
TDY travel/per diem: $ __

9. Office of Record (Current) AMCICP (Permanent) AMCICP

10. Record of Recent Results

Date	A	B	C	D	E	F	G	H	I
	↑		6 MECDs						
Pre-start			(SC/ST)		1	1 (MOU)	1/0	51 DEAs	0/1
Jan 79		31							
Apr 79			Proposed →	(7)	(5)	(2)		(9)	(4/4)
Dec 79		NBC: 29	3	(4)	(3)	(1)		(21)	
Jun 80		ENGR: 25	1 (+ 11)				1/2	(2 DEAs)	0/1
Apr 81	Domain	CCD: 8	2		1	1 (+ 1)	1/3	X	
Mar 82	of	MOUT					0/2	X	0/1
Jan 83	ST	4 MAAs				3 drafts		X	1/1
Mar 84	and	3 MATOVs				2 (MOU)	0/1	X	
EXCOM	SC	7 areas						X	
Feb 85		5 MATOVs				1 (+ 1)	0/1	X	
Nov 85		22 areas	(2)			(1)		X	
Feb 87		15 areas						X	
	↓								
Cumulative	19	~150	13	0	2	6	3/9	56 DEA + lots IEX	1/4

Key:*
- A - Operational Concept Agreement
- B - Common Mission Need Evaluation (Identification of Candidate Items)
- C - Materiel Requirement Agreement (ONST, MECD)
- D - Agreement on Cooperative R&D (feasibility/concept exploration & validation)
- E - MOU for cooperative R&D (FSD)/Production
- F - Standardization Agreement (new/revision)
- G - Exchange of Materiel for T&E or joint tests (from/to U.S.)
- H - Exchange of Tech Data
- I - Purchase of Foreign Materiel (by U.S./Partner Nation)

*Table entries in brackets are proposals or drafts

11. Comments U.S. proposed in 1987 new structure and rules for AAWG to increase its productivity. GE response uncertain, awaiting MoD decision

International Army Armaments Cooperation Forums Survey

1. Full Identification (forum and parentage)
AMC/DAT Electronics Equipment/Systems Working Group

Abbreviation: U.S./FR Electronic WG

2. U.S. Proponent
- ☐ OSD
- ☐ Army Staff
- ☐ SARD/PEO
- ☒ AMC
- ☐ SARD-IN
- ☐ TRADOC
- ☐ Other (Identify:)

3. Charter
Draft TOR, initialed 15 June 1986
TOR, signed by HoDs, 6 May 1987

4. Purpose Coordinate national RDT&E programs and intensify information exchange; cooperative development projects are not a primary goal

5. Structure: AMC-directed, MSC controlled forum, utilizing expert subgroups. Results are monitored/coordinated at Staff Talks

6. Forum Category

Forum Class	Forum Type	Representation	Seniority of Chairman	Focus
☒ Permanent	☒ Bilateral	☐ Military	☒ General Officer/SES	☒ Functional Area
☐ Temporary	☐ Multilateral	☐ Civilian	☐ O-6/GS-15/16	☐ Commodity
		☒ Both	☐ Other	☐ Weapons System

☐ Components
☐ Technology Base
☐ Other:

7. Activity
Start date (month/year): Jun 86
Meeting interval: 12 months
Meeting duration: 5 days (including visits to industry)

Number of nations: 2 total (incl. USA)
2 active
__ observers

Status on 1/1/88:
- ☒ active
- ☐ inactive
- ☐ terminated

Comments on activity level:
New forum created by AMC over some MSC reluctance.

Identification of participating nations: (circle chair) US, FR
HoDs co-chair

8. U.S. Army Participation
Army principal delegate: CG, CECOM (MajGen)
(agency, office code, rank)
Other Army agencies represented: CECOM, selected PM offices, CNVEO, USASAC, ODC-FR
Average number of Army participants: 8-20 (overseas vs. CONUS meeting)

Estimated resources invested annually by U.S. Army:
dedicated billet(s): __
total manyears: __ N/A
TDY travel/per diem: $ __

9. Office of Record (Current) AMCICP (Permanent) CECOM-IPO

10. Record of Recent Results

Date	A	B	C	D	E	F	G	H	I
Pre-start								~100 DEAs incl. 42 Army	
Jun 86						(1, SNR)		(6 rev) (4 new)	
May 87		(1)				(1)		(4 new) (4 canceled)	
Cumulative	-	(1)	-	-	-	(2)	-	50 Army DEAs incl 8 new electronics	-

Key:*
- A - Operational Concept Agreement
- B - Common Mission Need Evaluation (Identification of Candidate Items)
- C - Materiel Requirement Agreement (ONST, MECD)
- D - Agreement on Cooperative R&D (feasibility/concept exploration & validation)
- E - MOU for cooperative R&D (FSD)/Production
- F - Standardization Agreement (new/revision)
- G - Exchange of Materiel for T&E or joint tests (from/to U.S.)
- H - Exchange of Tech Data
- I - Purchase of Foreign Materiel (by U.S./Partner Nation)

*Table entries in brackets are proposals or drafts

11. Comments Biennial report by HoDs to four-star level (CG, AMC and French counterpart) not completed as of October 1988

International Army Armaments Cooperation Forums Survey

1. Full Identification (forum and parentage)
Panel II (Combat and Support Vehicles), NATO Army Armaments Group

Abbreviation: AC/225, PII

2. U.S. Proponent
- ☐ OSD
- ☐ Army Staff
- ☐ SARD/PEO
- ☐ AMC
- ☒ SARD-IN
- ☐ TRADOC
- ☐ Other (Identify:)

3. Charter
TOR approved by NAAG and promulgated by IS in Document AC/225-D/760

4. Purpose (1) Identify and develop cooperative programs in weapons systems, supporting systems, arms interchangeability, and future vehicle characteristics; (2) Develop STANAGs to support interoperability; (3) Exchange information in support of (1) & (2)

5. Structure: Panel is under direction of, and reports to, NAAG and CNAD. Its work is currently supported by six temporary subgroups: 1 sub panel (SP 6), 4 working groups of experts (WGE 1 to 4), and 1 technical committee (TMC NRMM)

6. Forum Category

Forum Class	Forum Type	Representation	Seniority of Chairman	Focus
☒ Permanent	☐ Bilateral	☐ Military	☐ General Officer/SES	☐ Functional Area
☐ Temporary	☒ Multilateral	☐ Civilian	☒ O-6/GS-15/16	☒ Commodity
		☒ Both	☐ Other	☐ Weapons System

☐ Components ☐ Technology Base ☐ Other:

7. Activity
Start date (month/year): 1969
Meeting interval: 6 months
Meeting duration: 2-3 days

Number of nations (incl. USA): 12 total, 12 active, ___ observers

Status on 1/1/88: ☒ active ☐ inactive ☐ terminated

Comments on activity level:
Steady

Identification of participating nations: (circle chair)
BE, CA, DA, FR, GE, GR, IT, NL, NO, SP, (UK) US
(GR and IT attend only 1 meeting/year)

Chairman not part of national delegation

8. U.S. Army Participation
Army principal delegate: HQDA, SARD-SM, O-4/O-5 (agency, office code, rank)
Other Army agencies represented: TACOM, Armor Center, TRADOC HQ
Average number of Army participants: 3-4 (Sometimes observers from ODCSOPS, AMCICP)

Estimated resources invested annually by U.S. Army:
dedicated billet(s): ___
total manyears: ___ N/A
TDY travel/per diem: $ ___

9. Office of Record (Current) SARD-IN (Permanent) Central U.S. Registry, Pentagon Rm. 1B889 (microfilm)

10. Record of Recent Results ** LATD = Light Armored Tank Destroyer, RV = Reconnaissance Vehicle, FLAV = Family of Light Armored Vehicles
BMS = Battlefield Management System, FMBT = Future Main Battle Tank (2000), FICVs = Future Infantry Combat Vehicle (2000), SAVE = Systems approach to vehicle electronics

Date	A	B**	C**	D	E	F	G	H	I
Pre-32 meeting		MND for FMBT (MND FOR FICV)	ONST for FMBT)			3 STANAGs 1 AEP			
Sept 84		(1:LATD)	ONST for FMBT			0/1		X	
Feb 85		skip MND for LATD	(ONST for FICV)					X	
Sep 85		(RV)		PFS on FMBT		(1)/1		X	
Feb 86		no objection to MND for FICV	ONST for FICV					X	
Sep 86		(FLAV)	Cancel FICV					X	
Feb 87		(BMS)						X	
Sept 87		MNDs on SAVE/BMS and FMBT Subsystems				(2)		X	
Jan 88			ONST for SAVE Cancel FMBT	Follow-on PFS on Subsystems and BMS		(4)		X	
Cumu-lative	—	5 System level & X comp	2 Active Projects	not a single NST /NSR	—	3 STANAGs & 7 drafts & 1 AEP	—	Some	—

Key:*
- A - Operational Concept Agreement
- B - Common Mission Need Evaluation (Identification of Candidate Items)
- C - Materiel Requirement Agreement (ONST, MECD)
- D - Agreement on Cooperative R&D (feasibility/concept exploration & validation)
- E - MOU for cooperative R&D (FSD)/Production
- F - Standardization Agreement (new/revision)
- G - Exchange of Materiel for T&E or joint tests (from/to U.S.)
- H - Exchange of Tech Data
- I - Purchase of Foreign Materiel (by U.S./Partner Nation)

*Table entries in brackets are proposals or drafts

11. Comments Hard work with modest results to date

International Army Armaments Cooperation Forums Survey

1. Full Identification (forum and parentage)
Panel III (Infantry Weapons),
NATO Army Armaments Group

Abbreviation: AC/225, P III

2. U.S. Proponent
☐ OSD ☐ Army Staff
☐ SARD/PEO ☐ AMC
☒ SARD-IN ☐ TRADOC
☐ Other (Identify:)

3. Charter
TOR approved by NAAG, promulgated by IS in NATO DOCUMENT AC/225 D/760

4. Purpose (1) Exchange information on concepts, doctrine, equipment programs, and research; (2) Identify areas/projects for cooperation; (3) Promote standardization/interchangeability/interoperability, incl. development of STANAGs

5. Structure: Panel is under direction of, and reports to, NAAG and CNAD. Its work is currently supported by one sub group: subpanel 1 (NATO Standard Small Arms Ammunition)

6. Forum Category

Forum Class	Forum Type	Representation	Seniority of Chairman	Focus
☒ Permanent	☐ Bilateral	☐ Military	☐ General Officer/SES	☐ Functional Area
☐ Temporary	☒ Multilateral	☐ Civilian	☒ O-6/GS-15/16	☒ Commodity
		☒ Both	☐ Other	☐ Weapons System

Focus	
☐ Components	
☐ Technology Base	
☐ Other:	

7. Activity
Start date (month/year): 1969
Meeting interval: 6 months
Meeting duration: 2 days

Number of nations: 12 total
(incl. USA) 12 active
__ observers

Status on 1/1/88:
☒ active
☐ inactive
☐ terminated

Comments on activity level: Steady

Identification of participating nations: (circle chair) (Chairman not part of national delegation)
(BE), CA, DA, FR, GE, GR, IT, NL, NO, SP, UK, US
(IT present 1 meeting/year; PO participates in SP/1 only)

8. U.S. Army Participation
Army principal delegate: ARDEC, SMCAR-CEG, SES
(agency, office code, rank)
Other Army agencies represented: HQTRADOC, Infantry School, ARDEC
Average number of Army participants: 3-6

Estimated resources invested annually by U.S. Army:
dedicated billet(s): __
total manyears: __ N/A
TDY travel/per diem: $ __

9. Office of Record (Current) SARD-IN (Permanent) US Central Registry, Pentagon

10. Record of Recent Results **SRAAW = Short-range antiarmor weapon; ICV WS = infantry combat vehicle weapon system

Date	A	B	C	D	E	F	G	H	I
Pre-31st meeting		MND for SRAAW MND for ICV WS	(ONST) (ONST)			7 STANAGs + 1AP			
Sep 83			revise			(1)/2 cancel 1		x	
Sep 84			ONST SRAAW			1		x	
Mar 85		(mortars)				2		x	
Sep 85		cancel SRAAW	ONST ICV WS			(1)		x	
Mar 86		(grenades)				(1)		x	
Sep 86		(MND mortar)				0/3		x	
Sep 87		(9 areas)						x	
Mar 88			Cancel ICV WS					x	
Cumulative	-	10+ areas & systems	2 ONSTs	0	0	9 STANAGs & 2 draft & 1 AP	-	some	-

Key:*
A - Operational Concept Agreement
B - Common Mission Need Evaluation (Identification of Candidate Items)
C - Materiel Requirement Agreement (ONST, MECD)
D - Agreement on Cooperative R&D (feasibility/concept exploration & validation)
E - MOU for cooperative R&D (FSD)/Production
F - Standardization Agreement (new/revision)
G - Exchange of Materiel for T&E or joint tests (from/to U.S.)
H - Exchange of Tech Data
I - Purchase of Foreign Materiel (by U.S./Partner Nation)

*Table entries in brackets are proposals or drafts.

11. Comments Utter frustration about lack of progress in Panel's domain of activity, attesting to paralyzing problems. SP/1 is important for NATO standardization. Cooperative R&D on infantry weapons is moving out of NAAG forums

International Army Armaments Cooperation Forums Survey

1. Full Identification (forum and parentage)
Quadripartite Working Group on Armor,
ABCA Armies Program

Abbreviation: QWG/Armor

2. U.S. Proponent
- ☐ OSD
- ☐ Army Staff
- ☐ SARD/PEO
- ☐ AMC
- ☐ SARD-IN
- ☒ TRADOC
- ☐ Other (Identify:)

3. Charter
TOR approved by WSO (now QSOP and published in annual updates of ABCA Armies Standardization Program Handbook

4. Purpose (1) Interoperability of firecontrol systems and ammo of main armament for MBTs and AFVs. (2) Maximum use of common/interchangeable components. (3) Agreement on concepts/operational procedures to enhance cooperation

5. Structure: TEAL provides guidance, WSO and PSO provide program management. This QWG has no subgroups at present

6. Forum Category

Forum Class	Forum Type	Representation	Seniority of Chairman	Focus
☒ Permanent	☐ Bilateral	☐ Military	☐ General Officer/SES	☒ Functional Area
☐ Temporary	☒ Multilateral	☐ Civilian	☐ O-6/GS-15/16	☐ Commodity
		☒ Both	☒ Other O-5	☐ Weapons System

☐ Components ☐ Technology Base ☐ Other:

7. Activity
Start date (month/year): 1972
Meeting interval: 18 months
Meeting duration: 5 days

Number of nations: 5 total (incl. USA) 4 active 1 observers

Status on 1/1/88: ☒ active ☐ inactive ☐ terminated

Comments on activity level:

Identification of participating nations: (circle chair)
AS, (CA) UK, US, NZ
Standing Chairman not part of national delegation

8. U.S. Army Participation
Army principal delegate: Armor Center, Combat-Development, O-6 (agency, office code, rank)
Other Army agencies represented: TACOM (sometimes)
Average number of Army participants: 3-4 + observes (USMC, NPOCs of related QWGS)

Estimated resources invested annually by U.S. Army:
dedicated billet(s): ___
total manyears: ___ N/A
TDY travel/per diem: $ ___

9. Office of Record (Current) AMCICP (Permanent) PSO

10. Record of Recent Results

Date	A	B	C	D	E	F	G	H	I
Pre-18 QWG	5 (10)					11 QSTAGs (9)			
Oct 85	5					5 QSTAGs 1 QAP		X	
Apr 87	(6 rev.)					1 cancel (3 rev.)		X	
Cumulative	10CPs + 6 draft	N/A	-	-	-	15QSTAGs + 4 draft + 1QAP	-	Lots	-

Key:*
- A - Operational Concept Agreement
- B - Common Mission Need Evaluation (Identification of Candidate Items)
- C - Materiel Requirement Agreement (ONST, MECD)
- D - Agreement on Cooperative R&D (feasibility/concept exploration & validation)
- E - MOU for cooperative R&D (FSD)/Production
- F - Standardization Agreement (new/revision)
- G - Exchange of Materiel for T&E or joint tests (from/to U.S.)
- H - Exchange of Tech Data
- I - Purchase of Foreign Materiel (by U.S./Partner Nation)

*Table entries in brackets are proposals or drafts

11. Comments QWG concerns about poor coordination between QWGs: 4 other QWGs involved in anti-armor mission. U.S. Hold finds QWG good forum for IEX with intangible benefits, but recommends delegation include full time delegate from TACOM. STAN List includes R&D projects but no evidence of QWG generating any cooperative projects

International Army Armaments Cooperation Forums Survey

1. Full Identification (forum and parentage)
Quadripartite Working Group on Artillery, ABCA Armies Program

Abbreviation: QWG/Arty

2. U.S. Proponent
- ☐ OSD
- ☐ Army Staff
- ☐ SARD/PEO
- ☐ AMC
- ☐ SARD-IN
- ☒ TRADOC
- ☐ Other (Identify:)

3. Charter
TOR approved by WSO (new QSOP, published annual update of ABCA Armies Standardization Program Handbook

4. Purpose (1) Standardize artillery procedures and ammo, (2) Develop surface to surface artillery concepts for year 2000, artillery meteorological requirements, and ADP interoperability, (3) Standardize artillery weapons past 1990.

5. Structure: TEAL provides guidance, WSO and PSO provide program management. This QWG has currently three subordinate groups: IEG (Arty Met., IEG (ICM&PGM), and SWP (IFAA)

6. Forum Category

Forum Class	Forum Type	Representation	Seniority of Chairman	Focus
☒ Permanent	☐ Bilateral	☐ Military	☐ General Officer/SES	☒ Functional Area
☐ Temporary	☒ Multilateral	☐ Civilian	☒ O-6/GS-15/16	☐ Commodity
		☒ Both	☐ Other	☐ Weapons System

☐ Components
☐ Technology Base
☐ Other:

7. Activity
Start date (month/year): 1971
Meeting interval: 18 months
Meeting duration: 5-7 days

Number of nations: 5 total
(incl. USA) 4 active
1 observers

Status on 1/1/88:
- ☒ active
- ☐ inactive
- ☐ terminated

Comments on activity level: Constant: until 1980, meetings were annual; since 1985, pressure to limit meetings to 5 days

Identification of participating nations: (circle chair) (Standing Chairman not part of national delegation)
(AS) CA, UK, US, NZ

8. U.S. Army Participation
Army principal delegate: US Army Artillery School, O-6
(agency, office code, rank)
Other Army agencies represented: AMCCOM (sometimes)
Average number of Army participants: 4-6 +1 observer

Estimated resources invested annually by U.S. Army:
dedicated billet(s): ___
total manyears: ___ N/A
TDY travel/per diem: $ ___

9. Office of Record (Current) AMCICP (Permanent) PSO

10. Record of Recent Results

Date	A	B	C	D	E	F	G	H	I
Prior to 12th meeting	6	9				26			
Oct 83	(2)	delete 3				(11)	HELBAT	X	
Jun 85	1	1 area				2QAPs		X	
Oct 86	2	8				2		X	
Cumulative	9CPs + 3 draft	~15	-	-	-	25QSTAGs + 11 draft + 3QAP	-	Lots	-

Key:*
- A - Operational Concept Agreement
- B - Common Mission Need Evaluation (Identification of Candidate Items)
- C - Materiel Requirement Agreement (ONST, MECD)
- D - Agreement on Cooperative R&D (feasibility/concept exploration & validation)
- E - MOU for cooperative R&D (FSD)/Production
- F - Standardization Agreement (new/revision)
- G - Exchange of Materiel for T&E or joint tests (from/to U.S.)
- H - Exchange of Tech Data
- I - Purchase of Foreign Materiel (by U.S./Partner Nation)

*Table entries in brackets are proposals or drafts.

11. Comments QWG concerns about lack of ADP interoperability, 105 & 155mm interoperability, airspace C^2, ammo resupply systems. Focus on interoperability, not cooperative R&D. The SWP(IFAA), specifically created to recommend cooperative R&D projects, only recommended certain QSTAG

International Army Armaments Cooperation Forums Survey

1. Full Identification (forum and parentage)
Quadripartite Working Group on Infantry, ABCA Armies Program

Abbreviation: QWG/Inf

2. U.S. Proponent
- ☐ OSD
- ☐ SARD/PEO
- ☐ SARD-IN
- ☐ Other (Identify:)
- ☐ Army Staff
- ☐ AMC
- ☒ TRADOC

3. Charter
TOR approved by WSO (aw QSOP, publ in annual update of ABCA Armies Standardization Program Handbook

4. Purpose TOR objectives: (1) Standardized weapons and ammunition, (2) Agree upon concepts of operations, (3) Standardize training aids and simulators, (4) Standardize other infantry related equipment

5. Structure: Armies direct the program through quadrilateral decisions at senior (VCSA) level, named TEAL, the program is managed by WSO (GO level) and PSO (O 5 level), composed of national army representatives. This QWG has currently 2 temporary subordinate groups: IEG (SRAAS) and SWP (WES).

6. Forum Category

Forum Class	Forum Type	Representation	Seniority of Chairman	Focus
☒ Permanent	☐ Bilateral	☐ Military	☐ General Officer/SES	☒ Functional Area
☐ Temporary	☒ Multilateral	☐ Civilian	☒ O-6/GS-15/16	☐ Commodity
		☒ Both	☐ Other	☐ Weapons System
				☐ Components
				☐ Technology Base
				☐ Other:

7. Activity
Start date (month/year): 1971
Meeting interval: 18 months
Meeting duration: 5-7 days

Number of nations: 5 total (incl. USA)
4 active
1 observers

Status on 1/1/88:
- ☒ active
- ☐ inactive
- ☐ terminated

Comments on activity level: Constant; until 1980, meetings were annual; since 1985, pressure to limit meetings to 5 days

Identification of participating nations: (circle chair) (Standing Chairman not part of national delegation)
AS, CA, (UK), US, NZ

8. U.S. Army Participation
Army principal delegate: US Army Infantry School, O-6
(agency, office code, rank)
Other Army agencies represented: AMC (sometimes)
Average number of Army participants: 4

Estimated resources invested annually by U.S. Army:
dedicated billet(s): ___
total manyears: ___ N/A
TDY travel/per diem: $ ___

9. Office of Record (Current) AMCICP (Permanent) Primary Standardization Office (PSO) Nassif Bldg., Falls Church, VA

10. Record of Recent Results **Incl. 4 proposals similar to those made by AC/225 P III, SPI forum in same time frame

Date	A	B	C	D	E	F	G	H	I
Prior to 12th meeting	7	14				7 QSTAGs			
Oct 84	(3)	1				(6 rev)**		X	
Apr 86		4				cancel 3 (3 new)		X	
Sept 87		1				1 - 1QAP		X	
Cumu-lative	7CPs + 3 draft	20+	-	-	-	15QSTAGs + 7 draft + 1QAP	-	Lots	-

Key:*
- A - Operational Concept Agreement
- B - Common Mission Need Evaluation (Identification of Candidate Items)
- C - Materiel Requirement Agreement (ONST, MECD)
- D - Agreement on Cooperative R&D (feasibility/concept exploration & validation)
- E - MOU for cooperative R&D (FSD)/Production
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- H - Exchange of Tech Data
- I - Purchase of Foreign Materiel (by U.S./Partner Nation)

*Table entries in brackets are proposals or drafts

11. Comments QWG expresses concerns about, lack of QSTAG validation, lack of materiel QSTAGs defining future equipment characteristics or design principles. QWG activity focused on IEX on future requirements, no follow through on cooperative R&D opportunities

GLOSSARY

AAWG	Army Armaments Working Group
ABCA	American-British-Canadian-Australian
ACDEP	Armor Combat Development Engineering Program
ADICP	Assistant Deputy for International Cooperative Programs
ADP	automatic data processing
AG	action group
AGARD	Advisory Group for Aerospace Research and Development
AHSG	ad hoc study group
AI	artificial intelligence
AMC	U.S. Army Materiel Command
AMCICP	Office for International Cooperative Programs, HQ AMC
AMRAAM/ASRAAM	Advanced Medium Range Air-to-Air Missile/Advanced Short Range Air-to-Air Missile
AO	Action Officer
AP	allied publication
APGM	Autonomous Precision Guided Munition
AR	Army Regulation
ARADCOM	Armaments Research and Development Command
AS	Australia
ASA(RDA)	Office of the Assistant Secretary of the Army for Research, Development and Acquisition
ASCC	Air Standardization Coordinating Committee
ASG	Assistant Secretary General
ATGM	Anti-Tank Guided Missile

AVSCOM	Aviation Systems Command
BDAR	battle damage assessment and repair
BMS	Battlefield Management System
BST	Bilateral Staff Talks
BSTA	Battlefield Surveillance and Target Acquisition
BTI	Balanced Technology Initiative
BWB	Bundesamt für Wehrtechnik und Beschaffung
C^2	command and control
C^3I	command, control, communications, and intelligence
CA	Canada
CAD	computer assisted design
CAM	chemical agent monitor
CAPS	Conventional Armaments Planning System
CD	combat development
CDI	Conventional Defense Initiative
CECOM	Communications-Electronics Command
CG	Commanding General
CMF	conceptual military framework
CNAD	Conference of National Armaments Directors
CP	concept paper
CRDEC	Chemical Research, Development and Engineering Center
CSA	Chief of Staff, Army
DARPA	Defense Advanced Research Projects Agency
DAT	Direction des Armements Terrestres
DCAé	Direction des Constructions Aéronautiques
DCP	Decision Coordinating Paper
DCS	Deputy Chief of Staff

DCSOPS	Deputy Chief of Staff for Operations and Plans
DCSRDA	Deputy Chief of Staff for Research, Development and Acquisition
DEA	Data Exchange Annex
DGA	Délégation Générale des Armements
DoD	Department of Defense
DPC	Defense Planning Committee
DRET	Direction du Recherche, des Etudes, et des Techniques
DRG	Defense Research Group
DSAA	Defense Security Assistance Agency
DUSD(IIP)	Deputy Under Secretary of Defense for Industrial and International Programs
ECCM	electronic counter counter measures
ECM	electronic counter measures
EM	electromagnetic
EMP	electromagnetic pulse
EO	electro-optics
EPLRS	Enhanced Position Location and Reporting System
ESM	electronic support measures
ET/LT	emerging technology in the long term
EW	electronic warfare
FACS	Future Armor Combat System
FICV	Future Infantry Combat Vehicle
FMBT	Future Main Battle Tank
FMoD	Federal (German) Ministry of Defense
FOFA	Follow On Forces Attack
FR	France

FSD	full-scale development
FWE	Foreign Weapons Evaluation
GC	general capabilities (ABCA)
GE	Germany, Federal Republic of
GO	general officer
HF	high frequency
HoD	Head of Delegation
HOL	high order language
HQ	headquarters
IA	international activities
IC	integrated circuit
ICM	improved conventional munitions
IEG	Information Exchange Group
IEX	information exchange
IGA	ingénieur général de l'armements
IME	International Materiel Evaluation
IMS	International Military Staff (NATO)
IR	infrared
IS	International Staff (NATO)
ISWG	independent special working group
IT	Italy
JCS	Joint Chief of Staff
JMSNS	Justification for Major System New Start
KE	kinetic energy
KTA	key technical area
LO	liaison officer
LTSS	long term scientific study

MAA	Mission Area Analysis
MAG	Main Armaments Group
MAS	Military Agency for Standardization
MASAI	MAS Administrative Instruction
MC	Military Committee (NATO)
MECD	Military Equipment Characteristics Document
MLRS	Multiple Launch Rocket System
MNC	Major NATO Commander
MND	Mission Need Document
MNS	Mission Need Statement
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MSC	major subordinate command
NAAG	NATO Army Armaments Group
NAC	North Atlantic Council
NAD	National Armaments Director
NADREP	National Armaments Director's Representative
NAMRAD	Non-Atomic Military Research and Development
NAPR	NATO Armaments Program Review
NATO	North Atlantic Treaty Organization
NBC	nuclear, biological, and chemical
NBMR	NATO Basic Military Requirement
NCARC	NATO Conventional Armaments Review Committee
NDI	nondevelopmental item
NIAG	NATO Industrial Advisory Group
NMA	NATO Military Authorities
NMI	non-major item

NSR	NATO Staff Requirement
NST	NATO Staff Target
NZ	New Zealand
ODUSD(IIP)	Office of the Deputy Under Secretary of Defense for Industrial and International Programs
ONST	Outline NATO Staff Target
OPLAN	Operational Plan
OUSD(A)	Office of the Under Secretary of Defense for Acquisition
PAPS	Phased Armaments Programming System
PEO	Program Executive Officer
PFS	Pre-Feasibility Study
PG	Project Group
PSO	Primary Standardization Office (ABCA)
QA	quality assurance
QO	quadripartite objectives (ABCA)
QSOP	quadripartite standing operating procedure
QSTAG	Quadripartite Standardization Agreement
QWG	Quadripartite Working Group (ABCA)
R&D	research and development
RAM-D	reliability, availability, maintainability, and durability
RDS	research, development, and standardization
RSG	Research Study Group
RSI	rationalization, standardization, and interoperability
SACEUR	Supreme Allied Commander, Europe
SC	Steering Committee
SCP	System Concept Paper
SEFT	Section d'Etudes et Fabrications des Télécommunications

SG	subgroup
SNR	Senior National Representatives
SNR(A)	Senior National Representatives, Army
SP	subpanel
ST	Staff Talks
STANAG	Standardization Agreement (NATO)
SWG	special working group
TLG	technology liaison group
TMC	technical management committee
TOR	terms of reference
TP	technical panel
TPO	Technical Project Officer
TRADOC	U.S. Army Training and Doctrine Command
TSGCEE	Tri-Service Group on Communications and Electronic Equipment (NATO)
TTCP	The Technical Cooperation Program
UK	United Kingdom
USA	U.S. Army
USAF	U.S. Air Force
USDR&E	Under Secretary of Defense for Research and Engineering
UV	ultra violet
VCSA	Vice Chief of Staff, Army
VLAM	Vulnerability/Lethality Assessment Methodology
WG	working group
WGE	working group of experts
WP	Working Party
WSO	Washington Standardization Officers (ABCA)

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18 SUBJECT TERMS *(Continue on reverse if necessary and identify by block number)*

Bilateral and multilateral institutional forums; international armaments cooperation; cooperative R&D; information exchange; standardization; American-British-Canadian-Australian Armies Standardization Program; NATO Army Armaments Group; Defense Research Group; NATO forums.

19 ABSTRACT *(Continue on reverse if necessary and identify by block number)*

The U.S. Army participates in hundreds of institutional forums dealing with aspects of international armaments cooperation, including bilateral forums with Germany and France; forums under the Senior National Representatives (Army); the American-British-Canadian-Australian (ABCA) Armies Standardization Program and Quadripartite Working Groups (QWGs); other multilateral forums such as NATO Army Armaments Group panels and the Military Agency for Standardization and its Working Parties; and the international technology research and development (R&D) forums of the Defense Research Group and The Technical Cooperation Program. With few exceptions such forums focus on information exchange and standardization of operational concepts, procedures, and materiel, not on generating cooperative R&D agreements. In some cases, for example, available ABCA forum records indicate that neither the work priorities nor the actual activities of the QWGs address cooperative R&D, even though it falls within their charters. In other cases, particularly in some of the NATO forums, it is evident that many projects in the past were started without serious commitments by participating countries to cooperative R&D.

Although the U.S. Army has taken many steps in recent years to foster cooperative R&D and production of defense materiel, the hundreds of institutional forums have produced only limited tangible results to that end. Virtually all of the dozen cooperative R&D agreements that are currently in effect for the Army were achieved through *ad hoc* forums (working groups chartered for the express purpose of negotiating and concluding a specific memorandum of understanding), not the institutional forums.

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